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APPLY TO

The Office of the Indian Industrial Conference,

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REPORT
OF
THE FIRST
Indian Industrial Conference
HELD AT BENARES
ON
**Saturday, the 30th December,
1905.**

"The Government of India are in full sympathy with the objects of the Indian Industrial Conference."—LETTER TO THE GENERAL SECRETARY, 16th March, 1906.

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INTRODUCTION.

"India in poverty !! Midas starving amid heaps of gold does not afford a greater paradox : yet here we have India, Midas-like, starving in the midst of untold wealth."—**SIR GUILFORD MOLESWORTH, K.C.I.E.**—(Paper on "The Industrial Development of India," pp. 264-277 of Report.)

"The desire to see the country economically independent will not be accomplished by merely patriotic demonstrations against foreign goods. Their importation can be prevented only by the manufacture in this country of the same quality at lower rates or of better materials at the same price. To do this enterprise is wanted more than self-sacrifice—enterprise on the part of students willing to take up technical subjects instead of law, philosophy and literature ; enterprise on the part of capitalists ready to invest intelligently in industries now taxed by borrowed capital."—**MR. T. H. HOLLAND, F. R. S.**—(Paper on "The Development of the Mineral Resources of India," pp. 146-165 of Report.)

THE Indian National Congress has from its very inception given prominent attention to the economic problem of the poverty of India. Among other causes of the great, and as many think, growing poverty of the people of India the Congress has always recognised the decline of India's indigenous industries as a principal one ; and it has urged on the attention of the Government the necessity of instituting a comprehensive industrial survey of India as a preliminary to the introduction of an organized system of technical education and to the adoption of effective measures which will have the effect of resuscitating old and bringing into existence new industries. The great and grievous famines of 1896-98 and 1899-1901 have pushed the economic problem to the forefront of Indian questions, and, as a result of the added consciousness of this fact thus created, the Congress has of late years given its foremost attention to the poverty problem. At the session of the Congress held in the year 1900 at Lahore, an Industrial and an Education Committee were appointed to think over and recommend for adoption practical measures for the development of indus-

tries and the spread of education, but the Committees somehow never reported to the Congress on either matter, and they were not re-appointed at the next succeeding session. One practical step, however, was taken by the Reception Committee of the Congress which met in Calcutta in December, 1901, when an Exhibition of Indian Industries was organized on a small scale as an adjunct of the Congress. Leading members of the landed aristocracy of Bengal like the Maharajahs of Mymensingh and Cossimbazar were members of the sub-committee which made arrangements for the Exhibition, while the leading Indian ruling chief of Bengal—the Maharajah of Cooch-Behar—presided at its opening ceremony. The Exhibition eminently succeeded in achieving the end for which it was organized, in that it opened the eyes of educated Indians to the present condition, and what is more important, the future possibilities, of India's manufacturing industries. It also led, as its immediate practical outcome, to the establishment of the Indian Stores, Limited, in Calcutta, for the storing and sale exclusively of indigenous articles—a step admirably calculated to stimulate a demand for country-made goods and indirectly to lead to their larger production. It is nothing but bare justice to mention in this connection the name of the Hon'ble Mr. J. Chaudhuri, the well-known public man of Calcutta, to whose initiative we owe the institution of the annual Congress Exhibitions and to whose self-sacrificing enthusiasm is largely due the successful working, on an increasingly large scale, of the Indian Stores, Limited, of Calcutta. It is a matter for satisfaction that the awakening to the need of industrial development did not turn out to be a mere three days' wonder. The Reception Committees of every succeeding session of the Congress have made it almost a point of honour with them to vie with one another in making the annual Exhibition a greater and yet greater success. Thus the Ahmedabad Exhibition of 1902, with which the honoured name of His Highness the Maharajah Gaekwar is associated, was on a larger scale than its predecessor, while in Madras, in 1903, was witnessed a

still grander Exhibition. All the three were considerably out-distanced by the Bombay Exhibition of 1904, a wonderful show which those who had the good fortune to witness and to admire it will not easily forget. True, the Benares Exhibition of 1905 was not to be compared with the Bombay, or perhaps with even the Madras Exhibition; the reason being that neither did the Government of the United Provinces come forward to support it as the Governments of Bombay and Madras had done and as the Government of Bengal is doing this year, nor were the people of the province so advanced and public-spirited as their brethren of the three progressive Presidencies. But if there was less of show and grandeur and if the arrangements left much to be desired, this may undoubtedly be claimed for the Benares Exhibition, that it contained a larger and more representative collection of every variety of articles of daily use made in India than any of the previous Congress Exhibitions. And this after all is their primary object.

The Exhibition Committee of Benares took an important step in the direction of progress, for which it deserves every credit. For many years past there was an idea in the air that an Industrial Conference would be a useful adjunct of the Congress. This was the opinion of so great an Indian patriot and reformer as the late Mr. Justice Ranade. That illustrious man gave concrete proof of his sense of the importance of such a body by organizing an Industrial Conference at Poona under the auspices of the Industrial Association of Western India, of which as of so many other useful institutions he himself was the parent. Three sessions of the Conference were held in the years 1891, 1892 and 1893, and did much excellent educative work, and it was always considered a pity that Mr. Ranade's departure to Bombay on his elevation to the High Court Bench should have meant the collapse of the Industrial Conference of Western India as generally of other institutions which his genius for organization and his patriotic fervour had brought into existence. Events have marched rapidly since then. If the country was not ripe for an organized industrial

movement a decade and a half ago, the same cannot be said now after the successful holding of several Industrial Exhibitions. The Exhibition Committee of Benares felt, in the language of its Chairman's Circular letter,* that while a knowledge of the present condition of Indian industries and the possibilities of their future development "is a condition precedent to the beginning of practical effort, the knowledge must be followed by well-considered and well-directed action before it can be turned to advantage. Clear and accurate knowledge as to the directions in which effort should be made for industrial development and the best means of achieving success in those directions should be made available to the people through those who have made a special study of such subjects. It seems to us that to secure this end," continues the Hon'ble Munshi Madho Lal, the worthy Chairman of the Committee, "it will be useful to organize an Industrial Conference in connection with this year's Exhibition, at which papers should be read on a few selected subjects, discussions held on the views enunciated therein, and resolutions may be passed embodying the conclusions arrived at by the Conference." The Committee was loath to act on its own responsibility, and accordingly it addressed about a hundred leading Indian gentlemen on the subject. The Committee waited for over two months for replies to the Circular, and when a large number of these were received it proceeded to consider what action it should take on them. It is remarkable that only three or four persons out of the large number addressed expressed doubts as to the utility of an Industrial Conference. These views, however, were carefully considered, and, not sharing their doubts and concurring in the opinion of the great majority who were for the inception of the new movement, it resolved, at its meeting held on the 19th August, 1905, that the First Indian Industrial Conference should be held in Congress week of last year.

It was intended from the outset that the Conference should be non-political in its character, "with a view to

*Appendix III, pp. xlvi-xlii.

secure the aid and co-operation of all competent men—Anglo-Indian and Indian, official and non-official—without reference to their political opinions." In pursuance of this resolution it was that the Exhibition, and not the Congress, Committee was entrusted with the arrangements of the Conference. And the abundant and genuine sympathy which was freely extended to the movement by every European—official as well as non-official—who was approached with a request for co-operation and help, by every Indian gentleman without reference to his official position or his political views, and by every section of the Press, beginning with the London *Times*, furnished complete justification for the Committee's decision. Extracts from some of the letters received by the Committee, which are printed in the appendices to this Report,* may be referred to in support of this statement. The *Pioneer* thought it fit to pour ridicule over the work of the Committee by alleging that within the time available, even a representative cricket match, not to speak of an Industrial Conference, could not possibly be organized. But the list of delegates (printed in Appendix VII †) is a conclusive reply to this ill-conceived sneer. For, what do we find on a reference to it? This, that such important and representative public bodies as the Madras Mahajana Sabha, the Committee of the National Fund of Calcutta, the Madras Landholders' Association, the Bengal National Chamber of Commerce, the Rifah-i-Am Association, Lucknow, the Council of the Dev Samaj, Lahore, the Central Agricultural Committee of Madras, and the Bengal Landholders' Association, besides a number of other public bodies and several public meetings, sent representatives to the Conference; while the President of the Madras Chamber of Commerce and the Secretary of the Karachi Chamber of Commerce—both European bodies, expressed their full sympathy with it while regretting their inability to send delegates. And among those who contributed papers to the Conference were men like Mr. D. M. (now Sir

* Vide Appendices III (pp. xlxi—lx) and VI (pp. lxxiii—lxxx).

† Pp. lxxxi—lxxxiii.

Daniel) Hamilton, Mr. H. J. Tozer of the India Office, Sir Guilford Molesworth, Sir Frederick Lely, Mr. W. H. Moreland, I.C.S., Mr. J. Hope-Simpson, I.C.S., Mr. T. H. Holland, F.R.S., Mr. Reginald Murray, Rajah Peary Mohan Mukerji, C.S.I., Mr. S. M. Johnson, lately President of the Upper India Chamber of Commerce, Sir Henry Cotton, Dewan Bahadur R. Ragoonath Rao, and several other eminent Indian as well as European gentlemen. Of those named above, Messrs. Hope-Simpson and Holland were present at the Conference. The practical support given to and earnest interest evinced in the movement by the various sections of the community in such unmistakable manner is a sufficient refutation of the kind and helpful criticism of the Allahabad paper.

The Government of India early took occasion to express its sympathy with the aims and objects of the Indian Industrial Conference. There was as evidence, the letter of Mr. W. L. Harvey, Secretary in the Department of Commerce and Industry.* "I shall watch the proceedings of the Conference with interest," says Mr. Harvey, writing on behalf of the Government, "and shall be glad to put before Government any information they may wish to give on the subject of industrial improvement or any measures they may indicate as likely to have a practical result in this direction." In acknowledging receipt of the Resolutions passed at the Conference, the Government of India has again expressed full sympathy with it; while in his remarkable speech in the course of the Budget debate in the Viceregal Legislative Council on the 28th March last, the Hon'ble Mr. J. P. Hewlett, Member in charge of the Department of Commerce and Industry, referred to the Conference in the following terms:—"The Government of India welcome the awakening of interest in this very important question which was evident in the discussions at the recent Industrial Conference at Benares." The Government of India as well as the several Provincial Governments have been treating the Conference with courtesy and consideration, and are supplying to the office of the General Secretary,

* Vide Appendix VI, p. lxxiii.

their publications bearing on or relating to agriculture, industries, finance and economics. It is no exaggeration to say that both from the Government and non-official Europeans the movement has received an amount of genuine sympathy which was beyond the most sanguine expectations of the organizers of the Conference at Benares. For this sympathy and encouragement, we are of course sincerely grateful to them. The movement for the development of Indian industries is beset with so many and such considerable difficulties that it is not possible to make much headway without joint action on the part of, and mutual good will between, the Government and the people, and the sympathy of the former must therefore be welcomed as a hopeful augury for its future success.

The proceedings of the Conference were opened by the Hon'ble Munshi Madho Lal as Chairman of the Exhibition Committee which organised it. It will not be amiss to say here of Munshi Madho Lal, that but for his enthusiasm and zealous co-operation the Conference could not have been held at all. It is no improper divulgence of the secrets of the Exhibition Committee to say that till the very date on which it formally and finally resolved to hold the Conference, there were differences among some of its most prominent members whether the Conference should be held or not; so much so, that at one time it became seriously a question with those who had a lively sense of the utility of an Industrial Conference, whether they might not be obliged to act independently of the Committee in this matter. There was, however, one individual who throughout stoutly stood up for the new idea and whose attitude went not a little to determine the Committee's decision in the end. And that was the Hon'ble Munshi Madho Lal. Regardless of age and health and position, Munshi Madho Lal laboured hard for the success of the Congress, the Exhibition as well as the Conference, and his services were fittingly acknowledged by the President of the Conference in his concluding speech.* Mr. Dutt did not exaggerate when he spoke of Munshi Madho

* Vide pp. 388-9 of Report.

Lal as "the life and soul of the Exhibition." The gratitude of all friends of Indian progress is due to the honourable gentleman, the foremost citizen of the holy city of Benares after His Highness the Maharajah, for the valuable services he rendered to the National Congress as well as the Industrial Exhibition and Conference in the year 1905.

It was a piece of singular good fortune that so competent a man as Mr. R. C. Dutt, C.I.E., was elected as President of the First Indian Industrial Conference. Mr. Dutt is one of the ablest as he is undoubtedly one of the most distinguished of living Indians. If his long and arduous service under the British Government, in the latter years as Collector and Commissioner, revealed to the country his powers as an administrator, his much valued work as Revenue Minister of Baroda has furnished proof of the possession by him in rich measure of the higher qualities of statesmanship. His versatile scholarship and liberal culture are attested by his enduring work as an author, and his high-minded and enlightened patriotism has always been gratefully appreciated by his admiring countrymen. The announcement that Mr. Dutt would preside over the Conference was hailed with delight all over the country, and no less a man than Mr. Dadabhai Naoroji wrote to say* how glad he was that the Conference was to be commenced under such good auspices that Mr. Dutt was to be its first President. It is superfluous to say more of Mr. Dutt's qualities, for as the Hon'ble Munshi Madho Lal well put it in his opening speech,† it would be to paint the lily white.

Of Mr. Dutt's Presidential Address we might say, as had been remarked of the memorable speech which he delivered as President of the Indian National Congress held at Lucknow six years before, that "it had peculiar merits of its own"; that "there was a note of urbanity in that speech which must have softened the heart of the most hostile critic"; that "in matter it was the speech of a practical man addressing an assembly of practical men";

*Vide Appendix VI, p. xxv.

†Vide p. 6.

that "it was inspired throughout with that moral persuasiveness which waits upon deep conviction, and is born of vast experience illuminated with the light of uncommon common-sense"; that "no more reasonable, effective and persuasive appeal has ever been made to rulers and ruled", and that "never was one of the deepest and most difficult problems more tersely, simply and convincingly stated."* A practical turn of mind, sobriety, a deep sense of responsibility, a clear head, far-sightedness, and lucidity of exposition, are among Mr. Dutt's distinguishing qualities, and his Presidential Address to the First Indian Industrial Conference is a splendid production of such a master-mind.

The speech of course must be studied in its entirety, but a few of the more important points thereof may as well be specially noticed here. Mr. Dutt refers to the two extreme views often expressed about Indian industries, one a despondent view—that Indian industries have no future against European competition, and the other a roseate view—that the increasing figures of Indian exports and imports are an index of the growth of Indian manufactures and of the prosperity of the people, and expresses his own belief that both these views are wrong. "As usual", he says, "the truth lies midway. We are beset with grave difficulties, but we have no reason to despair. *Our industrial condition in the present day is lamentable, but it is not hopeless. We have to face a severe and in some respects an unequal competition, but our future is in our own hands if we face our future like men.*" This is as accurate as it is a statesmanlike view to take of the situation, and its robust optimism is wholesome and cheering. Mr. Dutt asks us to clear our minds of cant and examine our position impartially and soberly as practical men.

"Our difficulties are of a two-fold nature. In the first place our old industries have undoubtedly declined, and we have to recover lost ground. In the second place we have to recover our position

*Introduction to the Report of the Fifteenth Indian National Congress, p. viii.

†Report, pp. 7-18.

under exceptional economic conditions which few nations on earth have to face. Our two difficulties may be briefly described thus :— Firstly, other competitors have got the start of us ; and secondly, we are unfairly handicapped in the race."

Mr. Dutt only echoes the universal feeling among his countrymen when he says that "we will not consent to see our country made a land of raw produce, or a dumping ground for the manufactures of other nations." Partial as he is to the old system of cottage industry, and anxious as he is to avoid the mistake of sending all our population to towns, Mr. Dutt recognises the necessity, under modern conditions, of changing, to some extent at any rate, the habit of carrying on our industries in our homes and cottages, and of creating large centres of industry in towns. "We must change our old habit of universal cottage industries, and learn to form Companies, erect Mills and adopt the methods of combined action, if we desire to protect or revive our industries." But the formation of Companies and the erection of Mills require capital, and Mr. Dutt points out that the conditions in India are not favourable to the accumulation of capital :

"I do not wish to travel into political subjects to-day, but it is necessary to mention, what is known to every one of you, that the sources of wealth in this country are not as broad and spacious as in happier countries. Our land is more heavily taxed than it is in England or America or Japan, and the land-tax in most provinces is enhanced at each recurring settlement. Our revenue is not all spent in India, a large portion of it is remitted for Home Charges year after year. And the highest and most lucrative appointments in the Empire are not open to us. All those facts tell against the accumulation of capital needed for large enterprises, and our moneyed men are poor compared to those in other lands. A man owning half a lakh of rupees is considered a rich man in India, while a man with only three thousand pounds in funds would hardly be deemed to have a decent competence in England."

Then there is the other difficulty that our fiscal legislation is oftener controlled by Lancashire than by us in this country. Mr. Dutt's published works* contain an exhaustive and masterly exposition of the history of the British

* *Economic History of British India; India in the Victorian Age.*

Government's fiscal policy towards India, and a study of it leaves no doubt in one's mind that the might of the Government has been systematically exerted against the existence, not to speak of the growth, of Indian industries. A "perfect plan of policy, both of compulsion and encouragement," was ordered to be adopted, the effects of which "must be to change the whole face of that industrial country, *in order to render it a field of the produce of crude materials subservient to the manufactures of Great Britain.*" These words occur in the Ninth Report of the House of Commons Select Committee which enquired into Indian affairs and the same policy has been pursued ever since the middle of the eighteenth century.* Mr. Dutt refers in his Presidential address to the latest instance of fiscal injustice which is still in operation—the imposition of an excise duty on the mill-owners of India to conciliate Lancashire. "I know of no act in modern fiscal legislation more unwise and hurtful to an infant industry" says he with just indignation, "than the imposition of an excise tax, unknown in any civilised country. And I know of nothing more humiliating to the Government of a Great Empire like India than the correspondence which you will find recorded in Parliamentary Blue Books, "leading to these fiscal changes." These, then, are the difficulties before us: "In the first place we have lagged behind, and have to recover lost ground. And in the second place, we have to run the race with the triple disadvantage of want of modern industrial training, want of capital and want of control over our own fiscal legislation."

"I mention these difficulties not to discourage you but because we have to face and conquer them. Few countries on earth would have succeeded under these difficulties, but I have faith in the capacities of our nation, in the patience and skill of our artizans, in the adaptability of our race to new methods, in the resources of this wonderful land, and in the advantages of cheap labour. I have been something of an optimist all my life; I think

* The reader is recommended to study the whole subject in Mr. Dutt's *Indian Trade, Manufactures and Finance*, in which the chapters bearing on these subjects are reprinted from his two larger works.

it better to fight and to fail than not to fight at all. But in this industrial movement I believe we are destined to fight and to conquer. I have no patience with those of my countrymen who throw up their hands in despair, and declare that all is lost. The history of the last twenty or thirty years shows that all is not lost, and that much has been gained."

After referring to the growth of the cotton and woollen industries during recent years in support of his plea for hopefulness for the future, Mr. Dutt turns to the Swadeshi movement :—

" And now, at the commencement of the Twentieth Century, we are more resolved than ever not to be beaten in this industrial race. I see in the faces of those who fill this hall to-day a strong determination that—God helping—we will work out our own salvation by our own hands. Men educated in English Schools and Colleges in India, men trained in the Universities of Cambridge and Oxford, have come to share this noble work with practical manufacturers and traders in India. And to-day there is a desire which is spreading all over India, that by every legitimate means, by every lawful endeavour, we will foster and stimulate the use of our own manufactures among the vast millions who fill this great Continent.

" Gentlemen, I am drifting into a subject which has raised much angry discussion when I speak of the Swadeshi movement. And yet I would not be fulfilling the duty which you have imposed upon me to-day, if I passed silently over that subject which is in every man's thought. I speak in the presence of some who are among the leaders of this movement in Bengal, and I speak from personal knowledge when I say, that these leaders have tried their very utmost to conduct this movement lawfully and peacefully, to the best interests of the people and of the Government. If there have been any isolated instances of disturbance here and there, we deprecate such acts. On the other hand, if the Government have, in needless panic, been betrayed into measures of unwise repression, we deplore such measures. But neither the rare instances of disturbance, nor the unwise measures of repression, are a part and parcel of the Swadeshi scheme. *The essence of the scheme, as I understand it, is, by every lawful method, to encourage and foster home industries, and to stimulate the use of home manufactures, among all classes of people in India.* Gentlemen, I sympathise with this movement with all my heart, and will co-operate with this movement with all my power. (The italics are ours.)

" Gentlemen, the Swadeshi movement is one which all nations on earth are seeking to adopt in the present day. Mr. Chamberlain is seeking to adopt it by a system of Protection, Mr. Balfour seeks to

adopt it by a scheme of Retaliation, France, Germany, the United States, and all the British Colonies adopt it by building up a wall of prohibitive duties. We have no control over our fiscal legislation, and we adopt the Swadeshi Scheme therefore by a laudable resolution to use our home manufactures, as far as practicable, in preference to foreign manufactures. I see nothing that is sinful, nothing that is hurtful in this; I see much that is praiseworthy and much that is beneficial. It will certainly foster and encourage our industries in which the Indian Government has always professed the greatest interest. It will relieve millions of weavers and other artizans from a state of semi-starvation in which they have lived, will bring them back to their handloom and other industries, and will minimise the terrible effects of famines which the Government have always endeavoured to relieve to the best of their power. It will give a new impetus to our manufactures which need such impetus; and it will see us, in the near future, largely dependent on articles of daily use prepared at home, rather than articles imported from abroad. In one word, it will give a new life to our industrial enterprises; and there is nothing which the people of India and the Government of India desire more earnestly, than to see Indian industries flourish, and the industrial classes prosper.

"Therefore I sincerely trust that the Swadeshi movement will live and extend in every province and in every village in India. There should be Associations formed in every District to extend and perpetuate this movement and to stimulate the use of country-made cloth and country-made articles, not only in towns but in rural villages. Such Associations should peacefully and quietly extend their operations from year to year, disregarding the jeers of their critics, and braving the wrath of their opponents. (The italics are ours.) Spasmodic and hysterical exhibitions should be avoided, for, as a great English writer remarks, strength consists not in spasms but in the stout bearing of burdens. Mindful of the great work we have to perform, we should work with the calm consciousness of doing our duty towards our countrymen. If we succeed in this noble endeavour, we shall present to the world an instance, unparalleled in the history of modern times, of a nation protecting its manufactures and industries without protective duties. If we fail in this great endeavour, and prove ourselves false to the resolutions we have formed and professed, then we shall deserve to remain in that state of industrial servitude to other nations from which we are struggling to be free."

The case for the Swadeshi movement cannot certainly be stated better. And it is the duty of every Indian who

is impressed by these weighty words of sober wisdom and earnest patriotism—and who can fail to be impressed?—to make a manly and noble resolve to do all that lies in him to make the great Swadeshi movement the unqualified success that it deserves and the interests of the country require it to be. Mr. Dutt brings his admirable speech to a close with a brief account of the work which is being done in the State of Baroda to foster and revive the industries of India.

After the Presidential Address came the reading of some of the papers specially prepared for the Conference. It goes without saying that every one of the European and Indian gentlemen who favoured the Conference with his contribution has rendered a public service which is entitled to our grateful recognition. It is obviously impossible to make aught but a passing reference to most of the papers. That some of them, for instance the two papers on Mining contributed by Mr. T. H. Holland and Rao Bahadur G. V. Joshi, are of very exceptional value, will be admitted by all. By the very nature of the case the papers are of unequal merit. But it may be broadly stated that there is hardly any of them which will not repay perusal.

The first group of papers bears on the greatest of Indian industries, Agriculture. And Mr. D. M. (now Sir Daniel) Hamilton, Mr. Lalubhai Samaldas, Dr. Harold H. Mann, Mr. W. H. Moreland, Mr. N. G. Mukerji, Mr. J. Hope-Simpson, Sir Frederick Lely, Mr. P. Rajagopalachari, Mr. H. K. Beauchamp, and Mr. John Kenny have done full justice to the many aspects of the problem of the improvement of Indian agriculture. Sir Daniel Hamilton* effectively brings out in the following passage the vastly important part the agriculturist plays in India :—

India's economic problem can be briefly stated thus—What are the wants of her people? They are these :—

Food,
Clothing,
Housing.

* Report, pp. 19-20.

and these three are one—Agriculture, for even the roof over his head has to be grown by the cultivator. And the cultivator has to bear not only his own burden, but also, in a very real sense, the burden of the Empire. He it is who provides the produce to enable our merchants to trade ; he it is who grows the cotton and the jute to run our mills ; he it is who provides the bulk of the traffic for the railways, and fills the steamers with the rice, the linseed, the jute and the indigo, the hides and the tea : he it is who brings the piece-goods from Europe ; he it is who pays the land revenue and the army, and grows the income of the Zemindar ; he it is who grows the opium and pays the bulk of the salt tax ; even the mineral industry depends on him, for the coal is wanted to run the trains and the steamers which carry the produce of the soil. The problems of India are undoubtedly the problems of Agriculture ; anything, therefore, which advances Agriculture advances the Empire. (Pp. 20-1.)

Sir Daniel Hamilton makes the following specific suggestions for the improvement of Indian agriculture :—

- (1) The buying up of the cultivator's debts by Government and so starting him with a clean slate, experimentally in one or two districts. (Pp. 21-2.)
- (2) The development of the co-operative principle as suggested below :—
 - (a) The Zemindars or other gentlemen of influence in the districts should join together and form themselves into district cash or grain banks, and should at the same time take steps to organize Co-operative Credit Societies in the villages on their properties ;
 - (b) These Co-operative Credit Societies should, to begin with, confine themselves to the lending of seed grain—the seed grain to be found by the zemindari district banks and to be advanced to the co-operative societies at 6 or 7 per cent. interest (cash transactions to be added later) ;
 - (c) Government should guarantee 3 per cent. on the capital advanced to the villages by the district banks—the difference between 3 and 6 or 7 per cent. being the inducement for the Zemindar to push the business. (P. 23.)

Sir D. Hamilton has also something opportune to say on the development of the date sugar industry in Central India. Here are his remarks thereanent :—“ Take for example, the date sugar trees which are now running to waste by the million in Central India. There you have the raw material of genuine Swadeshi sugar to be had for the lifting, and yet

none of the leaders of the people appear to be sufficiently interested in their poorer countrymen to show them how to tap the trees. I am safe in saying that in no other country would resources of this nature be left lying unused as they are in India" (pp. 24-5).

Mr. Lalubhai Samaldas in his paper (pp. 26-37) draws attention to the necessity of systematic enquiry into the methods of Indian agriculture (p. 30). The first Famine Commission in their Report say that "the defect in the efforts made by Government to instruct the cultivator has consisted in the failure to recognise the fact that in order to improve Indian agriculture, it is necessary to be thoroughly acquainted with it and to learn what adaptation is needed to suit modern and more scientific methods and maxims to Indian staples and climate." Mr. Wallace and Dr. Voelcker, who came out as experts to study the condition of Indian agriculture and to make recommendations for improvements therein, laid stress on a systematic enquiry being undertaken "not in a hurried way but by patient watching and learning without which no really sound knowledge will be obtained, nor any great improvement be intelligently inaugurated" Next, rightly pointing out that the problem is not merely an agricultural one but a social, economical and political one, Mr. Lalubhai refers to the extent to which sub-division of holdings has been carried on and deplores that the social customs and habits of the people prevent ready emigration from a thickly to a sparsely populated area and they also act as a deterrent to an agriculturist following any other calling than that of his father. "If these barriers be broken and if facilities are granted for the shifting of population to places having large culturable wastes," he says (p. 31), "pressure on land will be relieved in one quarter, while more land will be brought under cultivation in other quarters, and the total wealth of the country will be increased." Mr. Lalubhai then makes the following suggestions in regard to the extension of irrigation facilities:—

"The first thing in this connection is to find out the presence and depth of sub-soil water. At present the cultivators depend in this

matter upon persons who are reputed to possess the natural gift of finding out the presence of sub-soil water. That there are such men I know from personal experience. They, however, do not disclose their methods. The more scientific method is, however, the test by boring apparatus; and the free supply of such apparatus in places where it is needed would prevent the waste of money in digging useless wells." (P. 32.)

In ordinary years, the agriculturist having no irrigation facilities, has not to work for more than eight months a year, while the women of the house have not to work for even that length of time. The rest of the time is passed by the family practically in idleness. Mr. Lalubhai directs attention to this and rightly says that if means can be provided by which they can do some work during this period and earn some extra money, their condition will be improved to that extent. "The work will be such as will not be considered derogatory to the social status of the agriculturist and must not at the same time require an outlay of capital beyond his means." (P. 32.)

Mr. Lalubhai's next point is that the Indian agriculturist cannot without extraneous assistance undertake experiments or introduce improvements requiring an outlay of capital, and that it is the duty of Government to render such assistance. The Government of India, at the instance of the British Cotton-Growing Association, sanctioned a grant of money to the cultivators growing cotton on the security of their crops as in Egypt and the United States so as to ensure that reasonable interest is charged and that better profits accrued to the farmer than hitherto. Mr. Lalubhai urges—

"That Government having adopted the principle of making grants for improvement in the quality of one staple crop, should not stop there, but must extend similar patronage to other staple crops, although these may not be backed up by equally powerful associations. On the same principle the agriculturist should be assisted with capital for other agricultural improvements also, e. g., the digging of wells, the purchase of labour-saving appliances and better quality of seed, better manures, &c. It is the duty of Government to render such assistance to the agriculturists." (Pp. 33-4.)

Mr. Lalubhai next dwells on the need for a typical village enquiry as suggested by the Famine Union, and his observa-

tions deserve to be pondered over by the Government. Says he (pp. 35-6) :—

" We are familiar with the reasons given by Lord Curzon's Government for declining to grant such an inquiry. They are far from convincing. About the time the reply of Government was published, a few gentlemen in Bombay undertook such an inquiry on their own account. The late Mr. J. N. Tata and a prominent Native State gave the Committee all the necessary assistance for holding such an inquiry. After studying the results, it was seen that the inquiry to be useful should be conducted by experts in the line under orders from Government. Very often, the chief sources of information are in Government records and these are not available to non-officials. Then the *sowcar* whose books may have to be examined, will produce them only before a Committee appointed by Government. Thirdly, the revenue officers of the Government having more technical knowledge than non-officials, will be able to conduct the inquiry much better. Moreover, if the agriculturist tries to give an exaggerated account of his poor condition, these officers will be in a position to verify his statements. Again, if the inquiry were conducted by non-officials alone, Government will not pay much heed to their conclusions. Lastly, there is the question of funds. Government alone can supply the funds for such an inquiry throughout the whole country. It will of course be necessary to have a strong non-official element on such a Committee (at least) Local Governments can very well undertake such an inquiry on their own account within their own territories ; and may introduce necessary reforms in the light of such an inquiry."

Mr. Lalubhai concludes by making an appeal to his own educated fellow-countrymen, which deserves to be borne in mind and acted upon by those in a position to do so, at least as much as his exhortations to the Government. His subject is Land Tenure and he says thereon :—

" We, the non-official educated class, owe it to our poor brethren, the agriculturists, to make personal inquiries into their condition, to find out the causes that have led to the same and either to take remedial measures ourselves or to suggest them to Government. Even those of us who are not agriculturists themselves, can assist others in forming district agricultural associations, in studying the question from a general stand-point and in guiding their deliberations. Some of us ought to devote a portion of our time to studying the statistics relating to agriculture and land revenue and getting

information from the district associations and then representing the raiyat's case to Government." (P. 37.)

Now we come to the paper of Dr. Harold Mann on the same subject (pp. 37-41). According to him the present greatest need of agriculture in India is the bringing of the knowledge we already have to the notice of the cultivators, and he thinks that this task must be primarily undertaken by the educated people and not the Government. Says he :—

"In fact it is a case in which I think the enthusiasm of the landed proprietors and others of the people who have the interests of the country at heart, should lead them to stand out and use their money, their influence, their organising power, to bring before the eyes of the raiyats the advantages to be derived from adopting more up-to-date methods in their work." (Pp. 38-9.)

Dr. Mann's other suggestions are that demonstration plots, "certainly subsidised by Government, but under the supervision of local committees" should be formed in all the districts, and that these local committees might further "arrange on quite a small scale exhibitions of produce," so that the advantage both in crop and quality of the improved methods may be manifest. "The working out of all this, however, *must* fall on the people in each locality, and I can hardly believe (says the good Doctor) that with the matter put plainly before them, the zemindars, the rich men, the more educated and better informed men of our rural districts will fail in this matter, so vitally important to the future of the country." (Pp. 39-40.)

Mr. W. H. Moreland (pp. 41-46) hits the nail on the head when he says (p. 46) that "the supply of cheap capital stands out clearly as the central factor in the problem of agricultural improvement at the present time." Some of his observations are worth reproduction in this place :—

"...the provision of cheap capital is very much the most important agricultural improvement that can be suggested, simply because it is the condition precedent of improvements of other kinds. Go among the cultivators themselves, and ask each man what it is that he wants in order to make a larger income out of his holding. You will find that nearly every answer is a request for capital in some form or other. One man wants a well, but cannot afford to make it:

he wants capital. Another man wants more or stronger cattle : he wants the capital to buy them. Another wants to hold his produce till the harvest-glut in the market is over : capital is again what he needs. Another would grow wheat instead of gram if he could afford the seed : another would grow sugar-cane if he could pay the labour needed : another would grow potatoes if he could get the manure. All alike are tied down by the want of capital which compels them to make an inadequate use of their holdings.

"Thus, quite apart from the advance that could be hoped for from the applications of agricultural science to this great industry, the fact stands out that capital is the great need ; and so long as the cultivator cannot find money to realise his existing ideal, it is of little use to try and enlarge his ideal by the introduction of new elements that need still more money for their realisation.

* * * *

"*Firstly*, the capital required by the individual cultivator is small ; But, *secondly*, the aggregate amount required is very great ; while, *thirdly*, the supply must be made promptly and on terms the cultivator can accept." (Pp. 44-6.)

According to Mr. Moreland the policy of the Government of India to increase largely the expenditure on the agricultural department "can meet with full success only if the supply of capital is organised at the same time"; and either the co-operative movement, or some other equally effective form of organization, which "must be built up among the people who are to share its benefits," "is a necessary preliminary to any considerable improvement in the agriculture of the country ; nay more, it is necessary to prevent the progressive degradation of our greatest industry."

In the course of his paper Mr. Moreland, who ought to know as he is himself one of its Provincial heads, warns over-sanguine people against looking for large immediate results from the activity of the re-organized Agricultural Department.

"It is not going to work a sudden revolution in agricultural practice ; its work may be described as mainly a study of existing practices in the light of agricultural science, to see in what details they can be improved, and what adjustments they need to meet the new conditions involved by the increase of communications and the resultant widening of the market . . . the department will be learning rather than teaching for some years to come."

Mr. N. G. Mukerji, one of the most competent to speak on the subject, literally crams his paper (pp. 47-52) with most useful and feasible suggestions, so much so that no extracts can be easily made from it: we must ask the reader to study the text in the Report. He suggests the introduction of the cultivation of Badshabbog and Samudrali varieties of winter rice; a process of growing two other varieties of very superior paddy with very little rainfall; growth of Sambalpur tree cotton, which is almost equal to Egyptian cotton; the cultivation of another most important crop, *Nestapel*; crops which are rich in root nodules; improvements in the manufacture of *gur*; improvements in getting cattle manure; bone-manure, and improvements in agricultural implements.

Mr. Hope-Simpson introduces his excellent paper on "Co-operative Credit for Indian Agriculture" (pp. 52-65) in the following passage:—

"The material progress and redemption of India lies to my mind primarily in industry, secondarily only in polities, and so much can be effected by the former that it has always seemed to me a matter of great regret that hitherto the progressive party has sacrificed its best endeavours and energy solely at the altar of the latter. Progress in polities is bound to follow on the heels of material progress. It can never come as an antecedent. To the man who has to struggle year in and year out to gain daily bread for his family and for himself, it matters little under what form of Government he lives. All he desires is peace, and liberty to pursue his accustomed task. It is when the bare necessities have given place to some superfluous luxury, and when the acquisition of luxury has again left him some leisure, that the subject is at liberty and in a position to criticise the form and detail of Government, and to argue as to the steps to be taken for improvement. And reform cannot come from a class. It must come in accordance with the desire of the mass of the people. Until they are in a position to understand and demand reform, the work of the progressive class is as the voice of one crying in the wilderness. The inception of this annual Industrial Conference is a proof that those views are gaining acceptance. If they can be translated into practice, the impetus which will be given to Indian industry, and the improvement which will be effected in Indian agriculture cannot fail to be momentous. If we believe that the salvation of India lies in the mill-

and in the farm rather than in the forum and the lecture-hall, it is incumbent upon each one of us to do what in him lies to improve the conditions and methods of agriculture and handicraft." (Pp. 52-53.)

Mr. Hope-Simpson suggests —(1) that educated Indians should "choose some village where the agricultural community is comparatively free from feuds, and where, owing to its social constitution, or for some other reason, the members of the community would probably be willing to combine" and there "preach co-operation and combination" (p. 60); (2) that the problem of how to obtain good and reliable seed for his fields at a reasonable price, which is a continually recurring problem with the cultivator, "can be solved by the co-operative seed society, in which the members raise capital as for a bank, invest that capital in seed, distribute the seed among themselves on *Sawai*, and from the profits pay the interest and repay the borrowed capital by degrees, being left with a stock of good seed sufficient for the requirements of the society" (p. 64); (3) that *dharma-golas* for the maintenance of a stock of grain in the village may usefully be established and the co-operative principle applied to them" (p. 64); (4) that land mortgage societies of the Panjab type or similar societies of types fitted to local conditions might be made to serve a very useful purpose in preventing property passing from the hands of the hereditary small shareholders into those of the professional money-lending class" (p. 64); (5) that in regard to co-operative societies for the provision of capital to cultivators of sugar-cane to enable them to dispense with advances from the sugar-boiler and sell their produce in the open market, for which there is a wide opening, a further development is possible in providing the necessary machinery for boiling and refining so that the cultivator might himself place his *khand* upon the market, and so obtain the profit which at present goes to the middleman" (pp. 64-5); (6) that "the urban bank for small traders and officials, the provident fund for employés in offices and houses of business, the association of small producers with the object of placing their products

on the markets—all these are not only possible but easy," as "the possibilities of co-operation apart from agriculture." In this connection Mr. Hope-Simpson refers to "a most remarkable movement among the weavers, which has eventuated in the Benares Co-operative Silk-weaving Association," which "is of a true Swadeshi and self-help type".* Mr. Hope-Simpson's concluding words of exhortation well deserve to be taken to heart:—

"The scope of the co-operative movement is, as I have said, unlimited. What it requires most of all is intelligent propaganda and sympathetic supervision. In both of these directions the non-official is of more value than the official, for he is looked upon without suspicion by the people to whom he speaks. So I say to one and all—study co-operation until you thoroughly understand the principles on which it is based. Then go forward and preach, for co-operation once rightly understood, makes each man its missionary." (P. 65.)

We take the following from Mr. Lalubhai Samaldas's "Note on the Working of the Co-operative Credit Societies" (pp. 76-81):—

"When the Societies have shown good work, Government should show their confidence in them by utilising them at the time of granting Takavi at the time of famine, or loans under the Land Improvements Act. These Societies will be in a position to know the actual requirements of their members and hence if the money is distributed through their agency, no time will be lost in making inquiries. The money will reach the hands of the cultivator when needed most, and there will be less scope for corruption; again, if money is given for agricultural improvement through the agency of the societies, being on the spot, they will be able to see that it is used for the purpose for which it was lent. The confidence shown by Government will indirectly help the societies in another matter, as it will be sure to attract more deposits from non-members.

"The ground has now been cleared, and the seed has been sown, but much still remains to be done to have good appreciable results. The Bombay Registrar has submitted his proposals to Government about the appointment of honorary organisers to educate the villagers from the principles of co-operation up to the submission of the appli-

* For full particulars of this excellent organization, read article by Mr. Hope-Simpson in the *Indian Trade Journal*, of 3rd May, 1906, Vol. I, No. 5, pp. 162-4.

cation for registration and the subsequent initiation of the Committee into their duties. Here is work which ought to have attractions for all who have the good of the depressed masses at heart. Government could have done more in the same direction by following the example of Egypt and making arrangements with private banks, by granting them facilities for the recovery of their advances, for providing cheap capital to the agriculturists. That is, however, no reason why we should be deterred from supplementing the efforts of Government, and trying to make the working of the Act a success." (P. 81.)

Mr. H. K. Beauchamp, C. I. E., Secretary of the Central Agricultural Committee, Madras, discusses with characteristic ability the utility of Agricultural Associations in India (pp. 82-95), and Mr. J. Kenny, Secretary of the North Arcot District Agricultural Association, tells us something of the work done by his association (pp. 96-8). Both papers together form a convincing plea for the establishment of such Associations wherever favouring conditions exist.

In his paper on "Improvement of Sericulture" Mr. N. G. Mukerji, who has bestowed much anxious thought on and made special inquiries into the subject, formulates a definite scheme (pp. 98-103) for starting sericultural operations in the Punjab. The scheme appears to be an entirely feasible one and if worked by competent persons, promises to yield good profits to those investing money in it. It is, therefore, to be sincerely hoped that the enterprising men of the Punjab, who have already done so much in the cause of India's industrial advancement, will not fail effectively to interest themselves in it.

It is hardly possible to summarise, in the space at our disposal, now and here, the two most informing and instructive papers of Messrs. Joshi (pp. 103-146) and Holland (pp. 146-165) on the development of India's mineral wealth. They are simply invaluable and *must* be read and re-read with the utmost attention. But we may state here Mr. Joshi's specific suggestions:—(1) That where capital cannot otherwise be raised, Government will be pleased to give a *State guarantee*, on such conditions as it may deem fit (pp. 136-8); (2) that more liberal rules might be framed in regard to

prospecting and mining leases extending both the terms of the leases and the areas for prospecting and mining (pp. 138-9); (3) that *royalties* and *rents* might not be levied until a certain minimum limit of profit on the investment is reached (p. 139); (4) that as *prospecting work* is always more or less speculative and there is ever present the risk of failure, Government will be pleased to render to private enterprise the valuable aid of carrying it out at its own cost and by its own special staff of officers, at least in all important cases, and where it should decide not to undertake any such operations itself, it will be pleased to help private efforts with grants of money in aid of such work (under such rules and regulations as would guarantee the application of it for the intended purpose) (p. 139); (5) that in the matter of *mineral investigation* a special staff of experts should be appointed under the Director of the Geological Survey of India, charged with the duty of economic inquiry, so that this important work may be conducted in a more systematic, comprehensive and thorough manner, and that the results of such economic inquiries might be rendered available to the people through vernacular translations of Survey reports as the dissemination of such knowledge is calculated to assist the projection of mining undertakings (p. 140); (6) that in regard to *mining education*, Geology with special reference to Economic Mineralogy be introduced into the curricula of the Schools and Colleges as part of the general education, as is done in Europe and America, as a preliminary to the establishment of an independent, well-equipped, well-staffed College of Mines located in some central position in the mining area (p. 141). Mr. Joshi points out truly that the Governments of Native States owe a special responsibility to the people in this matter of the development of India's mineral development, for the two reasons that many of these States—notably the Nizam's Dominions, Rajputana, Gwalior, Cutch, Rewah and Kolhapur—possess considerable mineral resources, and "that the Native State Governments can do even more in the matter than the Government of India, and accord to private efforts a larger measure of

direct and indirect aid—in the shape of guarantees, subsidies, bounties and special concessions regarding prospecting and mining leases." (Pp. 144-5.) Rao Bahadur G. V. Joshi earnestly recommends—

"the creation, as a necessary part of the practical scheme, of a strong organization for the purpose—a central association with a network of branches all over the country, practically in the mining tracts—to work out in a practical way this problem of the development of our mineral resources. The objects of such associations to be *inter alia* these :—(a) to collect information regarding the mineral capabilities of the different parts of the country ; (b) to investigate the past history of the mining industry in the country ; (c) to study the question of the development of such mineral resources with the advice of experts and in the light of experience in other countries ; (d) to send out Indian experts—as the Japanese did at the start—say men like Professor V. S. Sambasiva Aiyar of Bangalore, to study in other countries the working of the mines and the systems prevailing there of mining legislation, mining labour and mining education ; (e) to arrange to disseminate among the people the information so collected and the results of such study and investigation in other countries by means of cheap vernacular literature, peripatetic lecturing, exhibitions, &c., (f) to create a healthy, well-informed public opinion on the subject, and with a view to the end to start a mining paper, and to have mining institutes established at various places for discussions and study ; (g) to organize mining enterprises in promising tracts and otherwise assist in the organization of such efforts ; (h) to render assistance in prospecting work in such cases ; (i) to undertake search work independently where there may be good prospects of success ; (j) and above all, to watch and promote in all practicable ways the mining interests in the country, &c., &c. The associations will require funds for their own museums, laboratories, &c. No large effort in the desired direction would seem possible and no healthy start without the aid of some such organization. (Pp. 143-4.)

Mr. Joshi suggests the following among other works as affording fair chances of success :—

1. *Aluminium industry* in Madras—now an established industry, several British Companies are already engaged in it.
2. *Manganese ores*.—The mining may be started in Dharwar or Belgaum where the deposits are rich and plentiful. The industry has a bright future before it.
3. *Copper-mining* at Jabalpur in the Central Provinces where rich deposits of the ore occur.

4. *Iron and steel works* at Salem where the richest deposits exist. • Absence of coal is a drawback. In France there is a similar difficulty, iron and coal not occurring together. The question, however, reduces itself to one of transport and can be easily settled.
5. *Granite works* in Madras where granite occurs capable of high polish.
6. *Glass works*, at Aligarh, in the United Provinces of Agra and Oudh. There is in the Provinces already an extensive manufacture of glass by native methods; it might be re-organised on European lines. So again, they may be started at Kapadvanj in Kaira zilla in the Bombay Presidency.
7. *Gypsum*, a most valuable manure and otherwise a useful mineral, in Satara or Phalton where the supply is large.
8. *Lead-mining*, in Kurnool, in the Madras Presidency, where theores occur in considerable quantities.
9. *Gold-mining*, in Dharwar. The schists there are rich, and only recently three British Companies have been formed with a capital of £ 160,000. Here the industry is most promising and the field is large. In the opinion of experts, the operations at present going on, tap but to a small extent the gold-bearing rocks, the extensive bands of schists.
10. *Diamond-mining*, at Panna in Bundelkhand and in Cuddapah in the Madras Presidency where we have long stretches of promising diamond conglomerate beds.
11. *Galvanised iron and tin plates*, in Bombay. The import is a large import, nearly 160 lakhs in 1904-1905. The manufacture is a simple process, only a supply is needed of iron, zinc and tin.
12. *Gold-washing* in Assam. Government should be appealed to to restore to the poorer classes in Assam this their ancestral craft which they have been for 35 years past prohibited from following, most unjustly, with a view to ensure gold concentration in the river beds, and in the interest of foreign exploitation.

We cannot take leave of Mr. Joshi without citing a passage in which he discourses wisely and well on the question of the import of foreign capital for purposes of industrial development of India. There is much misapprehension in the mind of Anglo-Indians in regard to the views of educated Indians on this subject, and consequently we may profitably invite attention to Mr. G. V. Joshi's lucid state-

ment which accurately represents the opinions of the most thoughtful of his fellow-countrymen :—

" We would suggest a resort to the aid of the foreign capitalist as the only alternative left. We are aware such a proposal would scarcely meet with general acceptance, and would be viewed with distrust and hostility. Men naturally do not desire to share with others the profits of their work and view with jealousy, foreign aid in such efforts. It has, however, to be remembered that such aid is to be sought only in the last resort and for the first stages of the new industrial endeavour. Interest would be all that we should have to pay on it; and there would be no interference of the foreign capitalist whatever, with our undertakings in their initiation and management. They would be ours entirely and in proprietary right, and under our administration, only run with borrowed capital. Besides, as soon as the first trials are passed and the concerns are well established, the loans would be repaid, and the aid of foreign capital would cease. No sacrifice would be entailed and no harm caused but such aid would enable us to do what must otherwise be left undone and we are persuaded that a hundred million pounds sterling so borrowed from the foreign capitalist on easy terms, and judiciously laid out, would not only be the means of enabling us to start numerous industrial enterprises on the newer lines but also of effecting a vast ameliorative change in the economic life of the people so as to send light and hope, comfort and joy, into thousands of cheerless homes in the country in a way of which we could have at present but a dim idea. A similar question has been for sometime past exercising the public mind in Japan. A large majority of the Japanese people are opposed to the introduction of foreign capital into the country; but according to Baron E. Shibusawa, President of the United Chamber of Commerce, the weight of authority and experience as represented by Marquis Ito and others is distinctly on the other side; and Baron Shibusawa himself holds the view that 'as the capital we have in the country is not enough, foreign capital is needed to open up the resources of the country'. (*Vide 'Japan by the Japanese'.*)"

Mr. Holland, the able and esteemed head of the Geological Survey of India, is one of those sympathetic Englishmen, anxiously interested in the progress and prosperity of India, whose presence in the country goes so far to sustain our hopes and aspirations under British rule. He is convinced that the most valuable of the imported minerals exist in this country in quantity sufficient and in a form suitable to

displace the foreign article in open competition, and is concerned that our energies should be directed towards the development of these (p. 156). He regrets that information in regard to these subjects is by no means wide-spread, and—“It is in the belief that the dissemination of information about our imperfections as well as our resources will in some small degree assist in placing our mineral industry on a sounder economic basis, that I have, with the full sympathy of Government, accepted the invitation of your Committee to address this Conference. It is with the assurance that we possess the natural elements essential for the restoration of our decayed metallurgical and chemical industries that I have diverted the energies of my colleagues, and have commenced the expenditure of public money for the investigation of our resources in minerals which are essential to industries now maintained entirely by imports, for which we have not only to pay heavy bills to other countries, but to exist always in a state of absolute dependence for articles that are no longer mere luxuries.” (P. 153.)

To turn our opportunities to account, it is necessary, firstly, (says Mr. Holland), to disseminate the information we already possess; secondly, to obtain more precise information of local conditions by an increase in the number of those who possess the necessary technical and scientific knowledge, and thirdly, to discover more enterprise on the part of those who can contribute to the necessary capital. Mr. Holland announced that his Department is “now engaged in the preparation of a Manual which will give a summary of everything that has ever been written about Indian minerals.” “But we have still to look to Conferences of this kind to assist in the dissemination and thorough assimilation of the published reports.” (P. 161.) He stated “that the Geological Survey Department will willingly determine minerals free of charge for any amateur who is willing to give the precise locality from which each specimen is obtained” (p. 162). In regard to capital, Mr. Holland deplored that “Messrs. Tata & Sons have been compelled to go to England to raise the capital necessary to launch a project (the Iron and Steel Company) that ought to commend itself to every patriotic capitalist in this country.” Mr. Holland thus concludes his valuable paper :—

“The discovery of a valuable mineral is thus but the beginning

of a long problem, necessitating the collaboration of a string of competent investigators. Our poverty is not in material, but in men capable of turning the natural material into the finished product. We want more than Government provision for technical scholarships : we want a reformation in the *tastes* of our students ; we want them to learn that the man with technical dexterity is of more use to the country than the writer of editorials or the skilful cross-examiner ; that applied science now belongs to the highest caste of learning, and is a worthy field for the best ability we can obtain.

"As far as our mineral resources are concerned, there is unlimited room for profitable enterprise : the country is sufficiently endowed by nature, not only to meet its own requirements, but to take advantage of its central position for competing with others in the Indian Ocean markets ; but until we find the chemical, metallurgical and mechanical workshops as attractive to our high-caste students as the class rooms for law and literature now are, the cry of *Swadeshi*, no matter how worthy the spirit it embodies, will remain but an empty word." (Pp. 164-5.)

Now we come to the groups of papers on the Cotton industry. Rajah Peary Mohan Mukerji leads off with a reasoned exhortation to his fellow-zemindars of Bengal, (paper on "Cotton Cultivation in Bengal", pp. 165-172), to undertake the cultivation of cotton in their estates and devote their best energies to the enterprise, as thereby "we shall make the success of the *Swadeshi* movement in the matter of clothing India's millions with home-made fabrics possible, and shall open a new sphere of activities which would lead to the prosperity both of the landholders and their ryots." Rajah Peary Mohan, who cannot surely be a prejudiced witness, thinks that in Bengal, at least, it is the landholders who are responsible for the failure of such efforts as have been made to extend and improve the cultivation of cotton. "They have been wholly apathetic as regards the cultivation of this important crop. Possessing the advantages of a suitable soil and favourable climatic conditions, they have hitherto neglected an industry which, whether they be moved by self-interest or actuated by feelings of patriotism more than demands their strongest support." (P. 172.)

The Hon'ble Mr. Vithaldas Damodher Thackersey, at present Chairman of the Bombay Mill-owners' Association,

says ("The Past, Present and Future Prospects of the Indian Cotton Industry," pp. 173-178) that, "if, as is fully anticipated, India shortly produces between two and three lakhs of bales of this Egypto-Indian cotton and if, as there is reason to believe from the experiments conducted in Southern India, 'Tree Cotton' may be plentifully and successfully grown, it will revolutionise the whole cotton industry." And he concludes a lucid consideration of the relative positions of power-loom mills and handlooms as factors in the production of cotton goods in India, which may be profitably studied, with an expression of his opinion that "the question of immediate revival of the handloom weaving industry on a commercial basis demands the most earnest attention of every well-wisher of India, and evidence gives promise of a successful issue to efforts put forward in this direction. It will be an evil day for India," Mr. Vithaldas says earnestly, "if by our negligence and want of support, we fail to place at the disposal of our weavers every improved and economical means of enabling them to profitably pursue their village industry on which directly and indirectly depend an immense number of our people, and drive them to poverty and distress." (Pp. 177-8.)

Along with Mr. Vithaldas's paper should be read the papers of Messrs. E. B. Havell, Rao Bahadur Raoji Bhai Patel, Mr. S. P. Kelkar and Sir Henry Cotton. (Pp. 187-207.) Mr. Havell, who is known to be strong for the handloom as against the power-loom mills, says that by spending about Rs. 10 per loom on improved weaving and warping apparatus the 400,000 handlooms in Bengal can be made to double their outturn. "This would cost about 40 lakhs. The same sum would not provide more than two or three fully equipped power-loom mills, which would not produce a twentieth of the amount which could be produced by 400,000 handlooms. Again, if Indian weaving mills can even now barely hold their own against the primitive unimproved native handloom, which is 150 years behind the times, where will their dividends be when the handloom weaver has doubled, trebled and quadrupled his present

outturn, as he can do by the use of up-to-date hand-weaving apparatus?" (P. 188.) According to Mr. Havell, "the improvement of Indian handlooms and other weaving appliances has now become the first industrial question of the day." (P. 189.) He suggests that capitalists with patriotic, philanthropic or other motives who wish to assist the Indian textile industry can find sound investments in three ways—1st, in the manufacture of improved hand-weaving apparatus; 2nd, in starting small hand-loom factories in suitable localities; 3rd, in spinning mills. His observations on all these points deserve perusal (pp. 189-90).

Mr. Raoji Bhai Patel, whose paper has been applauded as a particularly able one, does not think that the fact of the daily output of cloth per person engaged in the hand-loom industry being only six feet, should at all discourage us.

"Think for a moment (he tells us) of the 27 lakhs of weavers, who have successfully withstood the competition of the power-loom notwithstanding this miserable output, and you will at once be convinced, not only that they will be hard to beat, but also, that any fresh impetus given to their industry, will once again make them even the masters of the situation. If we can but raise his average from 6 feet to 6 yards, or even to 5 yards a day, we can make him strong enough to withstand competition and at the same time obtain an additional supply of cloth, even exceeding the total imports of India from Manchester." (P. 195.)

As a result of practical knowledge of the working of the looms available at present, Mr. Raoji Bhai is led to conclude that the problem of the loom is still open, and he states it as follows for intending inventors :—

"(1) Wanted, for the village weaver, a special attachment, by the addition of which to his existing loom, he can increase its working speed to 100 picks per minute. The cost of this attachment not to exceed Rs. 20 and the parts easy of repair by the village carpenter.

"(2) Wanted, for hand-loom factories and for well-to-do weavers, a loom, making 100 to 120 picks per minute and providing a simple arrangement, to control the picks per inch in the cloth. The construction to be as simple as possible and the parts should be easy of repair by town mechanics. The cost of the complete loom should not exceed Rs. 100.

"(3) Wanted, for the full development of the industry, hand adaptations of winding machines for warps and shuttle bobbins and of warping, beaming, and sizing machinery." (Pp. 199-200.)

Perhaps it may be mentioned at this place that two prizes of Rs. 200 and Rs. 300 will be awarded to looms satisfying the conditions stated in (1) and (2) above, which will be exhibited at the forthcoming Industrial Exhibition in Calcutta.

Sir Henry Cotton says in his short Note (pp. 206-7) that the immediate problem which we have to face is the encouragement of sufficiently simple machinery among the masses of the industrial community. "We want to improve the common spinning-wheel, the shuttle and the hand-loom." Sir Henry recalls what was done by Messrs. Thomson and Mylne in their well-known patent for sugar-crushing mills. The inventor made a fortune out of this patent and the people of the country gained greatly by the invention.

"Can nothing on similar lines be devised for the improvement of the present simple spinning apparatus, something which by the aid of hand-machinery might double the daily output of a weaver's work? Let the landholders' associations or benevolent individuals offer prizes or any reasonable encouragement for the discovery of such a cheap and simple mechanism, and I cannot doubt that it will readily be found. It does not seem necessary to go to England for such a purpose. There is surely enough mechanical inventive skill in India itself which would supply all requirements at a very small cost, and there must be many wealthy benefactors of their countrymen who would be willing to supplement the outlay from their own funds and so place the invention in the hands of those who could not otherwise afford it." (P. 207.)

Mr. S. P. Kelkar ("A Few Words on the Art of Handloom Weaving," pp. 200-205) has two suggestions of practical utility to make. They are contained in the two passages printed below :—

"It will be very useful to the general public if all the looms and the other apparatus connected with the work, be properly examined by experts and their merits or demerits made known. Many people are anxious to start some looms for the manufacture of cloth, and they do not know what loom to buy. If no such help will be forthcoming, many people will have to be disappointed by using costly

but comparatively useless things. Some such guidance as mentioned above is necessary.

"After such examination another step will be necessary to make these new looms popular amongst the weavers. Good looms and other machinery connected with them will have to be exhibited in different places, and their working shown to the people. Our people are very slow to adopt anything new, and unless steps are taken to bring to the notice of our weavers the advantages of the new plant they will not adopt them in their trade. Their extreme poverty is another drawback and to overcome that, well-to-do people will have to come to their help." (P. 205.)

Mr. S. M. Johnson's suggestive and thoughtful paper ("A Disability and a Danger from the point of view of India's Cotton Industry, pp. 178-187) is one of great present importance and must be read in full. It is difficult to select a few passages for citation here as nearly the whole of it is one connected argument. Besides, it is somewhat of a controversial character. There is no such general agreement either on the question of the hours of labour in Indian mills or on the hopelessness of the continued prosperity of the handloom as against the power-loom mill that we shall be justified in endorsing his views. Mr. Johnson, however, presents one side of the case with great ability, and it can be said that one will rise from a perusal of this essay much profited. On two points, however, divergence of opinion is almost impossible. These are where he writes of the grievous disability Indian industries labour under on account of the inefficiency of Indian labour, and of the ever present danger of anti-Indian fiscal legislation at the instance of Lancashire. "Probably the most characteristic and important result contributed to economic knowledge by the rapid industrial expansion of the United States of America during the last twenty-five years has been the demonstration of the remarkable potency and efficiency of cheap food and highly paid labour as a factor in national development," says Mr. Benjamin Kidd.* And it may be regarded as almost an exploded myth, the story of the

* In the fourth and last of a series of articles entitled "Economic South Africa" contributed to the *Times* in January, 1909.

cheapness of Indian labour. It is only apparently cheap, but really very dear, considering the wages in relation to the output. Secondly, it cannot be disputed, as Sir Guilford Molesworth says,* that "India needs protection from England as well as from foreign countries." Mr. Johnson brings out this aspect of the question very clearly.

Rao Bahadur R. N. Mudholkar writes on "Education and Industrial Development" (pp. 210-235). He goes to the root of the matter and supplies the reader with a mass of instructive facts relating to other countries which go unmistakably to prove the inseparable connection between educational progress and industrial development. It is of course out of the question to reproduce here even a fraction of what Mr. Mudholkar says to establish his point, which is not now disputed at all: one must read the text of the paper to enlighten himself fully. Mr. Mudholkar insists—and who will say wrongly?—that education is necessary even for workmen and artizans. We may here go back a little, and remark that Mr. Johnson also says in his paper noticed above, that

"It is the children of the cultivator in the villages and the children of the artizan and the cooly in the cities who require to be brought within the fold and educated so that they will not be divorced from the calling of their parents but sent back to it with all possible speed. The defect in our present system of education is," he thinks, "that under it these classes escape; it does not reach the lowest stratum, and many of those who are taught are too old and are taught too much and their aims are misdirected. The elementary schools I refer to should never take a child under 7 and never keep him after 9; and he should be taught only the simplest elements, given plenty of physical exercise, and then allowed to go back to assist his parents in their calling and be trained in it whatever it is." (Pp. 181-2.)

Mr. Mudholkar suggests that

"As in the Swiss, German* and Japanese schools, bifurcation will have to be introduced from the 10th or the 11th year, according as the pupil is intended for a literary course or an industrial course, and according as his education in regard to either of these lines is

* See p. 277 of Report.

to end with the primary school or to be continued in the secondary and higher schools." (P. 229.)

He further suggests that drawing and manual work must form a part of the course foremen, masters and managers of factories have to undergo.

"Our schools should give the same kind of instruction in the theory and application of the different sciences, the same kind of laboratory and workshop practice as is insisted upon in the corresponding institutions of Great Britain, Germany and the United States of America.....There should be at least one secondary technical school for each district corresponding to the high schools on the literary side, one superior school or college for each of the minor provinces and two for each presidency, and one polytechnic academy and institute of research for the country. The superior schools or colleges for this kind of education should be of the same status as Arts Colleges teaching up to the B. A. standard in the matter of general education. The polytechnic academy and institute for research should provide for post-graduate study. For a long time to come it would be necessary to make liberal provision for sending some of our best young men, who have received the scientific instruction available in the technical colleges and academies existing here to prosecute their special studies in the institutions of Great Britain, Germany, France, or the United States. The Government of India have already established some scholarships for this purpose; but their number will have to be increased."

"The proposals put forward require a hierarchy of qualified teachers. Those needed for primary and secondary schools will have to be trained up in the country. Those wanted for collegiate institutions and the academy of research will in the beginning have mostly to be brought from abroad. But even in regard to these institutions the aim should be eventually to have as professors and directors of research qualified Indians who have acquired the requisite knowledge in the best institutions existing in the advanced countries of the West."

" * * * this difficulty (that a lad of 12 or 18 lies under a compulsion to begin to work for earning his living and helping his father in the support of the family) should be met by the establishment of continuation schools, evening classes and regular courses of public lectures and demonstrations."

"There must be universal primary education, widespread secondary education, and sufficiently ample provision for the study of the higher branches of science and the promotion and encouragement of research."

"Primary education must be made compulsory." (Pp. 229-34.)

With Dewan Bahadur K. Krishnaswami Rao's plea for the establishment of at least one first class College of Technology, with the necessary library, laboratory, museum and workshop, which should be located in some central part of India and made an "All India Institute", every one will sympathise. His short paper on the subject (pp. 235-238) is conclusive and convincing.

Mr. T. R. A. Thumbu Chetti is of opinion (p. 241) that "the preservation of the village communities with proper training in commerce and agriculture must form the basis of technical education to start with. The improvement of agriculture and the commercial capabilities of each locality must commence with the village unit."

Mr. Martin Wood, a sincere friend of Indian aspirations in all spheres of national activity, calls attention to the "limitation prescribed by the extent—as regards distance and cost of coal-fuel for driving machinery—that is, as regards Indian coal fields on the one hand, and access to the sea-ports for European coal on the other," and says that Indians should try to discover some motor power other than steam, and especially consider where and how far water-power by gravitation can be applied, either directly, or through the generation of electricity. (P. 242.)

Mr. H. J. Tozer, after "welcoming with pleasure and hope the meeting of the first Industrial Conference," for which "no fitter place of assembly could be chosen than the ancient sacred city of Benares, to which for 3,000 years, millions upon millions have turned for light and guidance," summarises the results of his recent enquiries concerning India's manufacturing industries. He says :—

"(1) Agriculture, for any time worth considering, must be by far the most important Indian industry. In order to increase the produce of the soil, and the profits of the cultivators, educated Indians might lend aid in popularising new staples and better implements, in encouraging the use of selected seed, and generally, in advocating improved methods of cultivation. The advantages of co-operative credit societies might also be explained to raiyats and artizans.

"(2) Handloom weaving, the most important industry after agriculture, still shows much vitality, in spite of the competition of steam machinery. Although this ancient handicraft may ultimately be forced to give way under the pressure of competition, it is of importance socially that the process of decay should be gradual. The introduction of an improved handloom consequently appears desirable, but careful enquiry will be necessary to ascertain what kind of loom is best for ease and effectiveness of working. The purchase of the new looms might be facilitated by a system of advances.

"(3) Industries closely associated with agriculture require the application of more scientific methods. Sugar production and oilpressing could be made much more lucrative by the adoption of improved processes and by the utilisation of bye-products. There has been a regrettable decline in sugar production. The cultivation and manufacture of tobacco are also susceptible of improvement.

"(4) The production of manufactured articles of a complex character on a large scale by up-to-date methods requires—

- (a) The choice of a locality in which raw material and fuel can be obtained cheaply, and from which the manufactured products can be readily transported to the consuming markets.
- (b) An adequate supply of capital, so that production may not only be on a large scale, but on the best methods, and so that periods of depression may be tided over.
- (c) Provision of the most recent machinery and fittings.
- (d) Capable directors, possessing financial and commercial knowledge, aided by business managers with a complete grasp of technical details. European managers, even at high salaries, are most economical, until a race of Indian managers has been trained.
- (e) Well-paid and skilful artizans, whose hours, on grounds of true economy as well as of humanity, should be carefully restricted.

"Indians have done a good deal in the production of cotton and jute goods, and there are possibilities of expansion not only in these manufactures, but also in those of silk goods, leather and leather goods, iron and steel, paper, soap, &c.—attention being concentrated for the present on the simpler varieties of such articles.

"Now that there is general agreement among educated Indians concerning the need of industrial development, it is to be hoped that practical work will soon be undertaken. Some failures are inevitable at the outset, but with courage, persistence, enterprise, and mutual confidence, a large measure of ultimate success is assured.

"In conclusion, I would point out that industry is but one function of the social organism, and that for its free play and development conditions of a non-economic character must also be favourable. Thus social prejudices, differences of creed and caste, may impede industrial progress. These difficulties can only be indicated. Their solution must be left to those who have an intimate knowledge of Indian life and thought, enlarged by ideas imbibed from Europe, America and Japan." (Pp. 243-4.)

Mr. Alfred Chatterton in his paper on "Industrial Work in India" (pp. 245-257), gives the result of his experiences in the matter of lift irrigation, aluminium work, chrome tanning and hand-weaving. He makes one important practical suggestion, that the Government should do what it can to demonstrate the necessity for obtaining the best expert assistance in working out the details of industrial undertakings. "In each province it might be made part of the duties of specially selected officers to deal with applications of this kind, and if the work were well done, it would establish confidence and encourage enterprise. In the Madras Presidency this has to some extent been recognised, and the services of expert officers can usually be obtained by *bona fide* applicants. (P. 251.)

Mr. Reginald Murray, who has large experience as a banker, writes on "The Organization of Capital in India" (pp. 257-264). He tells us that "two important principles are here involved :—(1) the active distribution of unused capital; (2) the relegation of the act of distribution to experts. "For the organization of this system the form of financial concern which has best proved its soundness and utility is the Joint-Stock Bank" (p. 258). "It is a great mistake to open a Bank with a small Capital. A Bank to be an efficient collector and distributor of credit must be in a position to command, not solicit, credit. It must be in a position to lend large sums of money on loan if it expects to attract large sums." (P. 259.) As Joint Stock Banks assist only those who have large or moderate money transactions, Mr. Murray urges the establishment of Co-operative Credit Societies for the benefit of the vast population of working men whose wages seldom admit of their having any surplus in hand above their daily wants.

Sir Guilford Molesworth sends an important contribution on "The Industrial Development of India" (pp. 264-277), which anyone will find a profitable reading. He thus remarks on the immense natural resources of India:—

"India has untold wealth : wonderful natural resources, whether agricultural, mineral, or industrial, but they are to a great extent dormant. It has coal of an excellent quality, it has fine petroleum, large quantities of timber and charcoal : it has iron, of a purity that would make an English iron-master's mouth water, spread wholesale over the country, in most places to be had by light quarrying over the surface ; it has chrome iron capable of making the finest Damascus blades, manganese ore, splendid hematites in profusion. It has gold, silver, antimony, tin, copper, plumbago, lime, kaolin, gypsum, precious stones, asbestos : soft wheat, equal to the finest Australian, hard wheat, equal to the finest Kabanka. It has food-grains of every description : oil-seeds, tobacco, tea, coffee, cocoa, sugar, spices, lac, dyes, cotton, jute, hemp, flax, coir, fibres of every description : in fact, products too numerous to mention. Its inhabitants are frugal, thrifty, industrious, capable of great physical exertion, docile, easily taught, skilful in any work requiring delicate manipulation. Labour is absurdly cheap, and the soil for the most part wonderfully productive." (Pp. 265-6.)

Sir Guilford Molesworth cites with approval Principal Dyer's advice to the Government of Japan, that as the want of faith which the people then displayed in industrial enterprise, prevented what money there was in the country being usefully employed, it was necessary for the Government to take the lead, until confidence had been established in the practicability of such works, and give such assistance as might be necessary ; taking care, however, to give it in such a manner as really to encourage private enterprise. Why should not the Government of India give effect to the recommendation of the Committee on Industrial Education (composed of three European officials, and one European non-official, gentlemen), that "Private individuals be encouraged to start New Industries, which have been proved in the Institutes of Industrial Experiment (which the Committee recommend should be established in the several Provincial capitals) to be financially suitable to local circumstances, by the guarantee, for a limited period, of interest on the

capital they invest in the industry" (paragraph 35 iii, p. 11, Part I.) ? Sir Guilford next urges the establishment in India of technical guilds like that of South Kensington, in which the Indians might first receive technical education, and be afterwards apprenticed, and obtain workshop training and subsequent employment in the different State departments and factories. (Pp. 268-9.) Then he says that "there is no reason why the Government should not develop the agricultural industry in the same way that it has embarked on forestry, using the lands reclaimed by irrigation. This might serve as a school of agriculture generally, and specially for the improvement of the staple of cotton." (P. 269.) According to the learned writer "the most important question at present is how to relieve, as far as practicable, the burdens on agriculture," and he advocates the imposition of import duties which "would raise a revenue that would afford a much needed relief from the dead-weight of taxation on the land." "But the question should be decided, not on English grounds, or by English people in England, but by the Indian Government in the interests of India alone." (P. 271.) In conclusion, Sir Guilford Molesworth says that in order to develop the industries and vast potential wealth of India, it is necessary :—

"(1) To develop India's resources from within, pursuing that policy which has been initiated by Lord Curzon—in the creation of a Board of Agriculture, a Board of Scientific Advice, a Commercial Bureau, and by the institution of Industrial schools, Technical scholarships and apprenticeships for workshop training.

"(2) To improve the agricultural status, by the regulation of land revenues, by relieving the indebtedness of the agricultural classes, by advances to cultivators to enable them to purchase seed, by the establishment of experimental State farms which may form nuclei for the purchase or distribution of improved means and methods of agriculture.

"(3) To relieve the dead weight of taxation from the land, and at the same time to attract capital, both native and English, by protecting industries from being swamped by unfair and unlimited foreign competition. For this purpose to adopt a policy of moderate and carefully considered import duties, which should not be prohibitive, but (as in the case of the Sugar duties), place Indian industries in a position to hold their own.

"(4) To open external markets for produce with countries bordering India and to foster international and intercolonial trade by the exchange of mutual concessions and preferential treatment, which would be mutually advantageous.

"(5) To improve the internal market either by the establishment of State industries, which will supply the requirements of the Indian Government, or by the purchase of Indian produce as far as possible.

"(6) To give facilities to capitalists who may desire to start industries, for obtaining concessions, and for the acquirement of mining and other industrial rights, and to put a stop to the interminable delays to which the acquirement of such concessions is often subjected.

"(7) To pursue that policy of railway extension and irrigation works which has been eminently successful in contributing greatly to State revenues, and consequently to the reduction of taxation.

"(8) To promote trade, as far as practicable, by the adoption of the lowest possible rates for transport.

"(9) To govern India, *not* on English grounds, by English people in England, but by the Government of India in *the interests of India alone*; and to resist the interference of the Home Government in any attempt to sacrifice Indian interests to the exigencies of English party politics.

"India requires protection from England as well as from foreign countries." (Pp. 276-7.)

Come we now to Rai Bahadur Lala Baij Nath's two elaborate and informing papers on "Some Factors in the Industrial and Commercial Development of India" (pp. 277-302) and "On Some of the Leading Industries of Upper India" (pp. 302-321). Lala Baij Nath makes the following suggestions :—

(1) That as the great drawback in all technical education in India is the paucity of fields of employment for those who receive it, it is worth consideration whether special inducements should not be held out to graduates and under-graduates of our universities to qualify as agricultural experts by allotting to them a number of Tahsildarships and other posts in Government service where they could come in direct contact with the agricultural population, as well as employing them more largely than heretofore in the management of estates in the Court of Wards or large zemindaries controlled directly or indirectly by Government. (P. 285.)

(2) That Government should keep bull-stallions for improving the breed of cows and bullocks, and that at each districtshow it should

be made a point to award as many prizes for good bullocks as for good horses. (P. 286.)

(3) That fodder crops should be encouraged in all cultivated areas by remissions of rent or revenue, and in times of famine not only men but cattle should be relieved from starvation. (P. 286.)

(4) That a complete industrial survey is a necessity of the situation. (P. 296.)

(5) That the Indian Industrial Conference should publish a Directory, not only of mill and factory industries, but also of the principal hand industries of each place, the names of the chief manufacturers being noted and their prices given. (P. 290.)

(6) That there should be not only All India Exhibitions like the one now held with the Congress, but District and Provincial Exhibitions which should specially aim at encouraging and improving the local and the provincial trade and industry ; and that to all the Exhibitions, visits of artizans and traders, free, should be encouraged and they should be shown better methods of work. The local shows should be held in each district every year under the management of its Local and Municipal Board. (P. 301.)

(7) That the ordinary town or village weaver should be utilised and employed by companies of educated Indians started in each town for the production of hand-made cloth in larger quantities, and weaving and spinning factories working both by power and handlooms largely multiplied in each province. (P. 311.)

On the question of Industrial Survey, Lala Baij Nath rightly says that Government alone has the resources to undertake it, and that it is the duty of the Government to do so. The proposal was pressed on Government so long ago as 1872 by Dr. Forbes Watson, and it had the support of Sir Louis Mallet, who was then Under-Secretary for India. Dr. Forbes Watson was of opinion that "each kind of produce must be accurately described, the different varieties distinguished, the places and methods of production ascertained, the industrial and commercial value investigated and the question of supply and utilization discussed. And when all this has been done, provision must be made for rendering such knowledge easily accessible and available for immediate reference not only by Government authorities but by agriculturists, manufacturers and men of business generally."* The Government of India in a Resolution issued

* Vide pp. 297-299 of Report.

in the Home Department in 1888 recognised the need of such a survey, but nothing came out of it, and when the Industrial Conference of Western India urged the Government of Bombay to carry out a survey of that Presidency, the latter declined to do so.* The Committee on Industrial Education, to which reference has been made, recurred to the subject, and stated that "in the absence of a complete survey of Industries, we have found it impossible to make detailed recommendations as to particular industries and the methods of instruction that may with advantage be applied to each. *The making of such a survey must necessarily precede the development of any scheme of Industrial Instruction.*"† The Hon'ble Mr. Hewett, the Member for Commerce and Industry, similarly recognised the need for an industrial survey‡ and has urged the Provincial Governments—

"To make a survey of the state of indigenous industries within the area of their jurisdiction with a view to ascertaining the exact state of the various industries and handierrafts, the amount of the earnings and the present condition of the artizans respectively employed in them, the precise manner in which the different industries have been affected by competition with imported articles, the practieability of creating new markets or of developing markets which already exist, and the possibility of giving a new lease of life to these industries either by means of speial instruction or by the improvement of the appliances in use."§

* *Vide pp. 18-24 of the Report of the First Industrial Conference of Western India, held at Poona in August, 1891.*

† *Vide Report on Industrial Education by Lieutenant-Colonel J. Clibborn, Mr. C. A. Radice, I. C. S., Mr. R. E. Enthoven, I. C. S., and the Rev. F. Westcott, Part I, p. 18, par. 58.*

‡ "Much information bearing on this subject (of indigenous industries) has been collected in the Census Reports and in Monographs which have been prepared on the different industries ; but the material is scattered, there is no co-ordination of results, the subject is in general treated from the artistic point of view rather than from a business standpoint, and the information is in many cases neither sufficiently detailed nor sufficiently exact to be of much practical use."—Speech in the Viceregal Legislative Council, March 28, 1906.

§ *Ibid.*

And yet, the Government of Bengal has declined to move in the matter, even after the above express pronouncement of the Member for Commerce and Industry.* Our duty at this juncture is two-fold. Firstly, we must go on pressing the Government—the Supreme as well as the Provincial Governments—to institute a comprehensive Industrial Survey such as is indicated above; secondly, without waiting for Government action, educated Indians interested in the industrial movement ought to do what in them may lie to collect the requisite information. Bai Bahadur Baij Nath thinks that the duty should be undertaken by the associations for industrial advancement.

"It would perhaps facilitate work" he says, "were committees organised in each province with district committees working under them. And even though the information collected be not so complete as that collected by Government," he adds, "yet it will encourage a spirit of self-help and research and at once give some impetus to both local and provincial enterprise amongst the people in the directions most needed. The information will, perhaps, be more popular than any published by the Government and should be collected as soon as possible." (P. 290.)

To help in this work some questions have been framed by the General Secretary of the Conference, and the information may conveniently be collected in the shape of answers to the same,† In regard to the compilation of a Directory of Indian goods which Mr. Baij Nath suggests, too, it may be stated that one is under preparation in the office of the Indian Industrial Conference.

We have tarried long over Mr. Baij Nath's papers, and must pass on. Mr. Puran's plea for a Chemical Laboratory (pp. 321-333) will, we hope, meet with a prompt response. His specific proposal is as follows :—

"To start at once a Chemical Laboratory costing not more than Rs. 10,000; to start with, with the express purpose and direct aim of investigating, analysing and definitely determining the economic value of various raw materials of India which are available under

* Reply of the Hon'ble Mr. Richardson to the Hon'ble Syed Shurfa-din's question at a meeting of the Bengal Legislative Council held on the 18th August, 1906.

† See Appendix XI, pp. xcixii- cii.

present circumstances, described in Watt's *Dictionary of Economic Products of India* and the *Economic Geology of India*. This Laboratory can be worked on commercial lines. One of the Chemical industries that I have reviewed above, may be taken up and a model Chemical Factory started in connection with the Laboratory. When one such model factory is run for a sufficiently long period, it may be sold to a public company and another Chemical industry taken up. Thus this laboratory can be made the centre of information and a means of establishing various Chemical factories in the country". (Pp. 331-2.)

In the course of his paper Mr. Puran goes into some detail to prove the practicability of working *Turpentine*, *Shellac*, *Grass oils*, *Citronella*, *Anise oil* and *Thymol*, *Lemon oil*, *Camphor*, Chemicals such as *Cobalt Oxide*, *Chrome Oxide*, *Iron Oxide*, *Sulphuric Acid*, *Potassium Chromate*, *Potassium Permanganate*, *Zinc Oxide*, etc. (Pp. 326-31.)

Babu Gopal Chandra Banerji deals with an analogous subject ("Chemistry as an Industrial Science, pp. 334-40). His suggestions are—(1) "Where colleges are placed in charge of practical chemists, the Government should be asked to open a special practical class for the study of Chemistry, and students may be provided with scholarships and grants for original research work in the college. The Colleges should also be fitted up for such work, or else a laboratory should be established in some central place to enable students to go there as scholars and continue work with prospects of employment in the practical line." And (2) "We must appeal to Government to give early practical effect to the Tata scheme." (Pp. 339-40.)

Mr. S. M. Hadi, whose bulletin on the subject is appended to the report,* deals very briefly with "Sugar Industry" (pp. 340-42) He points out that until about twelve years ago sugar manufacturers in the sugar producing centres of the United Provinces were more numerous and were making greater profits in their business than they are doing now. A large number of factories has had to be closed on account of a decline in the profits owing to the competition

* "Improvements in Native Methods of Sugar Manufacture." Appendix I, pp. i-xviii.

with foreign sugars which sell cheaper and are of better quality. In course of his official enquiries, Mr. Hadi had an opportunity of studying and determining the defects in the existing methods of sugar refining and of thinking out improvements, "which have now reached a sufficiently satisfactory stage and have stood the severest criticism that the native refiners could offer. They have been thoroughly tested and approved, by the native experts of Bareilly and Rampur." In making improvements, Mr. Hadi's special aim has been to make more, better and cheaper *khand* without using appliances requiring a disproportionate capital outlay or introducing chemical processes that would require scientific knowledge on the part of the *khandsaris*. Mr. Hadi has taken out no patent for these processes as he was anxious that they should be freely adopted by the Indian people. They are not only "very simple" but, what is even more important in this country, they "do not involve the use of bone charcoal or any other material to which Hindus or Mahomedans could have religious objection." (P. 341.) The reader is recommended to study these new processes and do what he can to popularise them, as enormous quantities of foreign sugar are now imported while we should be able to do without it, and as "it can be stated with absolute certainty that the profits in this process cannot be less than 25 per cent. per annum on the total outlay." (P. 342.)

Mr. G. D. Ganguli of the Lucknow Museum concludes a very interesting account of "The Art-Industries of the United Provinces" (pp. 342-55) with the suggestion that depôts, such as the art ware dépôt attached to the Lucknow Museum, in which goods are received from the manufacturers and sold on their account to the general public, should be established by private enterprise or by District Boards at other centres of industry for the benefit of the local artizans. (P. 355.)

We have purposely reserved Dewan Bahadur R. Ragoo-nath Rao's paper (pp. 207-210) to the last, as we cannot better conclude than by citing the twelve precepts—aphorisms we may call them—of the venerable patriarch

who at the reverential age of 75, still devotes almost every waking moment of his to the unselfish service of the Mother-land. Thus proceeds the exhortation of Dewan Bahadur Ragoonath Rao to his countrymen :—

What we should now do is :—

(1) Improve agriculture by all the appliances both ancient and modern and produce more food than now.

(2) Reserve a sufficient quantity for our use in the next two or three seasons, lest they may prove unfavourable.

(3) Export the remainder.

(4) Implore our rulers for aid if their aid is absolutely necessary for carrying out the aforesaid measures.

(5) Improve the cultivation of cotton in extent and quality, to compete with cottons of modern countries.

(6) Combine and form companies for the manufacture of threads and cloths from cotton and from wool.

(7) Work mines in different parts of our country.

(8) Utilize all appliances available for the development of our numerous industries, helping the growing population of our country to earn their livelihood.

(9) Revive our old love for truth, bravery, industry, respect for our religion and kindness to our fellow-men.

(10) Give up bad and ruinous habits which have crept into our society.

(11) Become physically strong, active, enduring, morally great and religiously good, taking for our model the ancestors of our forefathers.

(12) Continue loyal, as we have always been, to our Sovereign, thankful to our brethren who wish well of us and dutiful to the great Sovereign of the Sovereigns, the Creator of the universe.

May He inspire us to make ourselves what we were when He once chose us to be so !

Here we bring to a close this review of the many admirable and valuable papers laid before the First Indian Industrial Conference. They are all contributed by thoroughly competent persons, and are such a mine of information on the subjects treated that we venture to think that no more useful and informing publication has ever been issued from an Indian non-official source. Once more we beg to express to one and all of them the grateful thanks of the organizers of the Conference.

In the Hon'ble Mr. Daji Abaji Khare's "Proposal of an Industrial Bureau" (pp. 356-59), and in some of the letters addressed to the Hon'ble Munshi Madho Lal, which are printed in Appendix III, as well as scattered in other places, are to be found some suggestions in regard to the organization and work of the Conference, which are summarised below :—

- (1) Mr. R. C. Dutt's suggestion in his Presidential address that District Associations should be formed for the spread of the Swadeshi movement. (P. 16.)
- (2) Suggestion by Rai Bahadur Lala Baij Nath that Provincial and District Committees should be formed for making industrial survey. (P. 200.)
- (3) Proposal of an Industrial Bureau by the Hon. Mr. Daji Abaji Khare. (Pp. 356-8.)
- (4) Suggestion by Dewan Bahadur K. Krishnaswami Rao that Standing Committees of the Industrial Conference should be formed at every important industrial and commercial centre of India. (P. 1, app.)
- (5) Suggestion by Rajah Peary Mohan Mukerji for the appointment of a permanent committee to make an industrial survey of the country ; and for the creation of a fund for the support of industries. (P. iii, app.)
- (6) Dewan Bahadur Ambalal S. Desai's suggestion for the consideration of how to secure a co-ordination of the efforts of the various provinces for the introduction of new industries. (P. iii, app.)
- (7) The Hon. Sir V. C. Desicachari's suggestions for starting societies—say one for each province—to collect funds for maintaining students who go to foreign countries for receiving technical education, and societies for collecting and publishing information. (P. iii-iv, app.)
- (8) Dewan Bahadur R. Ragoonath Rao's suggestion that organizations working throughout the year under the direction of the Head Conference should be established all over the country. (P. liv, app.)
- (9) Mr. K. Natarajan's suggestion that the efforts of the Conference should be concentrated on the establishment of a Bank. (P. liv-v, app.)
- (10) Babu Purnendu Narayan Sinha's suggestion for the formation of committees for carrying out industrial survey. (P. lxviii, app.)
- (11) Establishment of a committee for collecting information, etc. (P. lxxi, app.)

It is not necessary to dwell here on the Resolutions passed at the Conference and the speeches delivered in moving, seconding and supporting them. They may all be read in the Report.* It is enough to refer to the establishment of Provincial Committees to give effect to the Resolutions of the Conference and generally to carry on industrial work ; to the nomination of Mr. R. N. Mudholkar as General Secretary of Conference ; to the appointment of a whole-time paid assistant secretary who works under orders of the General Secretary, and to the allotment of funds for meeting the expenses of the General Secretary's office, as evidence of a sincere desire to make the Conference a really living movement. As Mr. Hume well says,† "good, honest, unselfish work for the good of others is never thrown away," and it is to be earnestly hoped that with the sympathy of the Government on one side and the active co-operation of the people of the country on the other, the Indian Industrial Conference may progress and prosper without check or hindrance, and that it may prove of ever increasing service in the great and grand movement for the rehabilitation of Industrial India.

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*Pp. 360-389 of Report.

†P. lxxx, app.

SUMMARY OF PROPOSALS.

A.—Organization and Work of the Conference.

1. District Associations should be formed for the spread of the Swadeshi movement. (*Mr. R. C. Dutt*, p. 16.)
 2. Provincial and District Committees should be formed for making Industrial Survey. (*Rai Bahadur Lala Baij Nath*, p. 299; *Rajah Peary Mohan Mukerji*, p. lii; *the Hon. Sir V. C. Desikachari*, pp. liii-iv; *Babu Purnendu Narayan Sinha*, p. lxviii; and p. lxxi.)
 3. An Industrial Bureau should be established. (*The Hon. Mr. Daji Abaji Khare*, pp. 356-9.)
 4. Committees of the Industrial Conference to work throughout the year should be formed at all important centres of the country. (*Dewan Bahadur K. Krishnaswami Rao*, p. 1; and *Dewan Bahadur R. Ragoonath Rao*, p. liv.)
 5. How to secure a co-ordination of the efforts of the various provinces for the introduction of new industries should be considered. (*Dewan Bahadur Ambalal S. Desai*, p. liii.)
 6. Funds should be created for the support of industries. (*Rajah Peary Mohan Mukerji*, p. lii); and for sending students abroad for receiving technical education (*the Hon. Sir V. C. Desikachari*, pp. liii-liv).
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B.—Agriculture.

7. There should be a composition of the ryots' debts by Government. (*Mr. D. M. Hamilton*, pp. 21-2; and *Mr. Lalubhai Samaldas*, p. 79.)
8. Co-operative Grain Banks should be established with a Government guarantee. (*Mr. D. M. Hamilton*, pp. 23-4.)

9. Government should make a systematic inquiry into the methods of Indian Agriculture. (*Mr. Lalubhai Samaldas*, p. 30.)
10. Emigration from congested areas to places having large culturable wastes should be encouraged. (*Do.*, p. 31.)
11. Government should give a free supply of boring apparatus to ryots. (*Do.*, p. 32.)
12. Employment should be found for the ryot and his womankind during periods of non-employment. (*Do.*, p. 32.)
13. There should be Government assistance to ryots to enable them to grow better crops, &c. (*Do.*, p. 33.)
14. Government should institute an inquiry into the economic condition of typical villages as recommended by the Famine Union. (*Do.*, p. 35.)
15. Educated Indians should make inquiries into the condition of the agriculturists. (*Do.*, p. 37.)
16. Non-officials should bring knowledge of improved methods of agriculture to the notice of the ryots. (*Dr. Harold H. Mann*, p. 38.)
17. Local Committees should be formed for the establishment of agricultural demonstration plots. (*Do.*, p. 39.)
18. These committees should arrange for exhibitions of produce on a small scale. (*Do.*, p. 39.)
19. Some form of organizations should be created by the people to provide cheap capital to the ryot. (*Mr. W. H. Moreland*, pp. 44-6.)
20. Cultivation of Badshabhog and Samudrabali varieties of winter rice should be introduced. (*Mr. N. G. Mukerji*, p. 47.)
21. A new process of growing two other varieties of very superior paddy with very little rainfall (explained in the paper), should be introduced. (*Do.*, p. 48.)

22. Growth of Sambalpur tree cotton, which is almost equal to Egyptian cotton; should be encouraged. (*Mr. N. G. Mukerji*, p. 49.)
23. Another most important crop—*Nestapet*, should be introduced. (*Do.*, p. 49.)
24. Crops which are rich in root-nodules should be widely introduced. (*Do.*, p. 50.)
25. Improvements in the manufacture of *gur* (explained in the paper) should be introduced. (*Do.*, p. 51.)
26. Suggested improvement in collecting cattle manure. (*Do.*, p. 51.)
27. Bone manure to be used. (*Do.*, p. 51.)
28. Improvements to be made in agricultural implements. (*Do.*, p. 52)
29. Initiative in founding Co-operative Credit Societies to be taken by the people. (*Mr. J. Hope-Simpson*, p. 60.)
30. Co-operative seed societies should be established. (*Do.*, p. 64.)
31. *Dharma-golas* to be founded on co-operative principles. (*Do.*, p. 64 ; also Dr. H. H. Mann, p. 40.)
32. Land mortgage societies of the Punjab type or similar societies of types fitted to local conditions might be made to serve a very useful purpose in preventing property from passing from the hands of the hereditary small share-holders into those of professional money-lending classes. (*Do.*, p. 64.)
33. Co-operative Credit Societies should be formed for the provision of capital to cultivators of sugar-cane to enable them to dispense with advances from the sugar-boilers, &c. (*Do.*, p. 64.)
34. Government should show confidence in successful Co-operative Credit Societies by utilising them at the time of granting *takavi* at the time of famine and loans under the Land Improvements Act. (*Mr. Lalubhai Samaldas*, p. 81.)

35. Appointment of honorary organizers to educate the villagers from explanation of principles of Co-operation to starting of society. (*Mr. Lalubhai Samaldas*, p. 81.)
36. Follow the example of Egypt and make arrangements with private banks, by granting them facilities for the recovery of their advances, for providing capital to the agriculturists. (*Do.*, p. 81.)
37. Agricultural Associations should be formed at provincial and district head-quarters. (*Mr. H. K. Beauchamp*, p. 84, *et seq.*)
38. Bengal zamindars should pay special attention to cultivation of cotton. (*Rajah Peary Mohan Mukerji*, p. 172.)
39. Educated Indians should lend aid in popularising new staples and better implements, in encouraging the use of selected seed, and generally, in advocating improved methods of cultivation ; as well as in popularising Co-operative Credit Societies. (*Mr. H. J. Tozer*, p. 243.)
40. Government should develop the agricultural industry in the same way that it has embarked on forestry, using the lands reclaimed by irrigation. "This might serve as a school of agriculture generally, and especially for the improvement of the staple of cotton." (*Sir Guilford Molesworth*, p. 269.)
41. Improve the agricultural status, by the regulation of land revenues, by relieving the indebtedness of the agricultural classes, by advances to cultivators to enable them to purchase seed, by the establishment of experimental State farms which may form nuclei for the purchase or distribution of improved means and methods of agriculture. (*Sir Guilford Molesworth*, p. 276.)
42. Special inducements to be held out to graduates and undergraduates of our Universities to qualify as agricultural experts by allotting to them a number of Tahsildarships and other posts in Government service

where they could come in direct contact with the agricultural population, as well as employing them more largely than heretofore in the management of estates under the Court of Wards or large Zemindaries controlled directly or indirectly by Government. (*Rai Bahadur Lala Baij Nath*, p. 285.)

- 43. The keeping of bull-stallions for improving the breed of cows and bullocks, and awarding prizes for good bullocks at agricultural shows. (*Do.*, p. 286.)
 - 44. Fodder crops should be encouraged in all cultivated areas by remissions of rent or revenue, and in times of famine not only men but cattle should also be relieved from starvation. (*Do.*, p. 286.)
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C.—Mining, Textile and Other Industries.

- 45. Date sugar industry to be started and developed in Central India. (*Mr. D. M. Hamilton*, pp. 24-5.)
- 46. A definite scheme for starting sericultural operations in the Punjab outlined. (*Mr. N. G. Mukerji*, pp. 99-103.)
- 47. Not individual but organized co-operative efforts indispensable and to be put forth for developing mining industry. (*Rao Bahadur G. V. Joshi*, pp. 135-6.)
- 48. Resort to be had to foreign capital if capital cannot be raised in the country itself for mining enterprises, and where such aid becomes necessary, a State guarantee should be given on conditions similar to those on which Railway companies are permitted to borrow for their purposes. (*Do.*, pp. 136-8.)
- 49. More liberal rules should be framed in regard to mining and prospecting leases extending both the terms of the leases and the areas for prospecting and mining. (*Do.*, pp. 138-9.)
- 50. That royalties and rents might not be levied until a certain minimum limit of profit on the investment is reached. (*Do.*, p. 139.)

51. That as prospecting work is always more or less speculative and there is ever present the risk of failure, Government should render to private enterprise the valuable aid of carrying it out at its own cost and by its own special staff of officers, at least in all important cases, and, where it should decide not to undertake any such operations itself, Government might help private efforts with grants of money in aid of such work. (*Rao Bahadur G. V. Joshi*, p. 139.)
52. That in the matter of mineral investigation, a special staff of experts should be appointed under the Director of the Geological Survey of India, charged with the duty of economic inquiry, that it may be made in a more systematic manner than at present; and that the results of such inquiry should be published in vernaculars as the dissemination of such knowledge is calculated to assist the projection of mining undertakings. (*Do.*, p. 140.)
53. That in regard to Mining education, Geology with special reference to Economic Mineralogy be introduced into the curricula of the schools and colleges as part of the general education, as is done in Europe and America, as a preliminary to the establishment of an independent, well-equipped, well-staffed College of Mines located in some central position in the mining area. (*Do.*, p. 141.)
54. As a beginning on the new lines a number of mining enterprises affording fair chances of success suggested. (*Do.*, pp. 142-3.)
55. Mining Associations be established to work out in a practical way this problem of the development of our mineral resources. The object of such associations stated. (*Do.*, pp. 143-4.)
56. Governments of Native States to take special interest in the Mining industry and accord to private effort a large measure of direct and indirect aid, in the shape of guarantees, subsidies, bounties and special

- concessions regarding prospecting and mining leases. (*Rao Bahadur G. V. Joshi*, pp. 144-5.)
57. Immediate revival of the handloom weaving industry on a commercial basis necessary (*Hon. Mr. Vithaldas D. Thakersey*, p. 177). Improvement of Indian handlooms and other weaving appliances the first industrial question of the day. (*Mr. E. B. Havell*, p. 189.)
58. Spend about Rs. 10 per loom on improved weaving and warping apparatus in Bengal ; &c. (*Do.*, p. 188.)
59. Capitalists wishing to assist the Indian textile industry to invest in three ways :— 1st, in the manufacture of improved hand-weaving apparatus ; 2nd, in starting small handloom factories in suitable localities ; 3rd, in spinning mills. (*Do.*, p. 189.)
60. Suggestions made about the kind of cottage loom needed. (*Rao Bahadur Raoji Bhai Patel*, pp. 199-200.)
61. Expert opinion to be obtained on the merits and drawbacks of the improved handlooms now before the public, and the other apparatus connected with the work. (*Mr. S. P. Kelkar*, p. 205.) Careful enquiry necessary to ascertain what kind of loom is best for ease and effectiveness of working. (*Mr. H. J. Tozer*, p. 243.)
62. After such examination, good looms and other machines connected with them should be exhibited in different places, and their working shown to the people, if these new looms are to become popular among the weavers. (*Do.*, p. 205.)
63. As "we want to improve the common spinning-wheel, the shuttle and the hand-loom" so as to "double the daily output of a weaver's work," let the land-holders' associations or benevolent individuals offer prizes or any reasonable encouragement for the discovery of such a cheap and simple mechanism." (*Sir Henry Cotton*, pp. 206-7).
64. The purchase of new looms might be facilitated by a system of advances. (*Mr. H. J. Tozer*, p. 243).

65. The ordinary town or village weaver should be utilized and employed by companies of educated Indians started in each town for the production of hand-made cloth in larger quantities, and weaving and spinning factories working both by power and handlooms largely multiplied in each province. (*Rai Bahadur Lala Baij Nath*, p. 311.)
66. Attention should for the present be concentrated on the simpler varieties of such articles as silk goods, leather and leather goods, iron and steel, paper, soap, &c. (*Mr. H. J. Tozer*, p. 244.)
67. It is very important for Indians to carefully weigh the, at present master-factor of the situation in India, viz., the limitation prescribed by the extent—as regards distance and cost—of coal-fuel for driving machinery—that is, as regards Indian coal fields on the one hand, and access to the sea-ports for European coal. It is for them to direct their attention to the discovery, for India, of some other motor-power than steam; and especially to consider where and how far water-power by gravitation can be applied, either directly or through the generation of electricity. (*Mr. W. Martin Hood*, p. 242.)
68. Government should do what it can to demonstrate to the people the necessity for obtaining the best expert assistance in working out the details of industrial undertakings, by making it part of the duties of specially selected officers to deal with applications of this kind. (*Mr. Alfred Chatterton*, p. 251.)
69. "To relieve the dead-weight of taxation from the land, and at the same time to attract capital, both native and English, by protecting industries from being swamped by unfair and unlimited foreign competition. For this purpose to adopt a policy of moderate and carefully considered import duties, which should not be prohibitive, but (as in the case of the Sugar duties), place Indian industries in a position to hold their own." (*Sir Guilford Molesworth*, p. 276.)

- 70. "To open external markets for produce with countries bordering India and to foster international and inter-colonial trade by the exchange of mutual concessions and preferential treatment, which would be mutually advantageous." (*Sir Guilford Molesworth*, p. 276.)
- 71. "To improve the internal market either by the establishment of State industries, which will supply the requirements of the Indian Government, or by the purchase of Indian produce as far as possible." (*Do.*, p. 276.)
- 72. "To give facilities to capitalists who may desire to start industries, for obtaining concessions, and for the acquirement of mining and other industrial rights, and to put a stop to the interminable delays to which the acquirement of such concession is often subjected." (*Do.*, p. 276.)
- 73. "To pursue that policy of railway extension and irrigation works which has been eminently successful in contributing greatly to State revenues, and consequently to the reduction of taxation." (*Do.*, p. 276.)
- 74. "To promote trade, as far as practicable, by the adoption of the lowest possible rates for transport." (*Do.*, p. 277.)
- 75. "To govern India, *not* on English grounds, by English people in England, but by the Government of India in the interests of India alone and to resist the interference of the Home Government in any attempt to sacrifice Indian interests to the exigencies of English party politics." (*Do.*, p. 277.)
- 76. Wanted a complete Industrial Survey of the country under the direction of the Government. (*Rai Bahadur Lala Baij Nath*, p. 296-9.)
- 77. Such a survey should be undertaken by the associations for industrial advancement. (*Do.*, p. 299.)
- 78. Directories of not only mill and factory industries, but also of the principal hand industries of each place should be published by the Indian Industrial Conference. (*Do.*, p. 299.)

79. There should be held besides the All India Congress Exhibitions, local and provincial Exhibitions, which should specially aim at showing the things made in that district or province as well as encourage and improve the local or provincial trade and industry. To the All India as well as provincial and local Exhibitions, visits of artizans and traders, free, should be encouraged and they should be shown better methods of work. A show should be held in each district every year under the management of its Local and Municipal Boards. (*Rai Bahadur Lala Baij Nath*, p. 301.)
80. The following industries can be profitably started at once :—Turpentine, Shellac, Grass oils, Citronella, Anise oil and Thymol, Lemon oil, Camphor, Chemicals such as Cobalt Oxide, Chrome Oxide, Iron Oxide, Sulphuric Acid, Potassium Bichromate, Potassium Permanganate (Condy's fluid), Zinc Oxide, Red Lead and other pigments. (*Mr. Puran*, pp. 326-31.)
81. Sugar Refineries using the new processes invented by Mr. S. M. Hadi should be started. (*Mr. S. M. Hadi*, pp. 340-2.)
82. Depôts in which goods are received from the manufacturers and sold on their account to the general public should be established by private enterprise or by the District Boards at centres of industry accessible by rail. (*Mr. G. D. Ganguli*, p. 355.)
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D.—Technical Education.

83. The children of the cultivator in the villages and the children of the artizan and the cooly in the cities should be educated "so that they will not be divorced from the calling of their parents but sent back to it with all possible speed." These elementary schools should never take a child under 7 and never keep him after 9: and he should be taught only the simplest elements, given plenty of physical exercise, and then

- allowed to go back to assist his parents in their calling and be trained in it whatever it is." (*Mr. S. M. Johnson*, pp. 181-2.) "Education is necessary even for workmen and artizans." (*Rao Bahadur R. N. Mudholkar*, p. 229.)
- 84. "As in the Swiss, German and Japanese schools, bifurcation will have to be introduced from the 10th or the 11th year, according as the pupil is intended for a literary course or an industrial course, and according as his education in regard to either of these lines is to end with the primary school, or is to be continued in the secondary and higher schools." (*Do.*, p. 229.)
- 85. Drawing and manual work must form part of the course foremen, masters and managers of factories have to undergo in secondary schools, which "should give the same kind of instruction in the theory and application of the different Sciences, the same kind of laboratory and workshop practice as is insisted upon in the corresponding institutions of Great Britain, Germany and the United States of America." (*Do.*, p. 231.)
- 86. At least one secondary technical school for each district corresponding to the high schools on the literary side, one superior school or college for each of the minor provinces and two for each presidency, and one polytechnic academy and institute of research for the country required. (*Do.*, p. 231.) At least one first class College of Technology with necessary library, laboratory, museum and workshop should be opened in some central part of India. (*Dewan Bahadur K. Krishnaswami Rao*, pp. 235-8) "We must appeal to the Government to give early practical effect to the Tata scheme." (*Babu Gopal Chander Banerji*, p. 340.)
- 87. More liberal provision than exists at present should be made for sending some of our best young men to foreign countries to receive technical education in the higher grades. (*Rao Bahadur R. N. Mudholkar*, p. 231.)

88. The qualified teachers needed "for primary and secondary schools will have to be trained in the country. Those wanted for collegiate institutions and the academy of research will in the beginning have mostly to be brought from abroad. But even in regard to their institutions the aim should be eventually to have as professors and directors of research qualified Indians who have acquired the requisite knowledge in the best institutions existing in the advanced countries of the West." (*Rao Bahadur R. N. Mudholkar*, p. 232.)
89. For the benefit of "the majority of the people in India who are in such poor circumstances that a lad of 12 or 13 lies under a compulsion to begin to work for earning his living and helping his father in the support of the family," continuation schools, evening classes and regular courses of public lectures and demonstrations should be established. (*Do.*, p. 232.)
90. There must be universal (free and compulsory) primary education, wide-spread secondary education, and sufficiently ample provision for the study of the higher branches of science and the promotion and encouragement of research. (*Do.*, p. 234.)
91. "Preservation of village communities with proper training in commerce and agriculture must form the basis of technical education." (*Mr. T. R. A. Thumbo Chetty*, p. 241.)
92. Technical guilds, like that of South Kensington, in which the people "might first receive technical education, and be afterwards apprenticed, and obtain workshop training and subsequent employment in the different State departments or factories." Industrial schools, Technical scholarships and apprenticeships for workshop training, should be instituted. (*Sir Guilford Molesworth*, pp. 268-9 and 276.)
93. "Where colleges are placed in charge of practical chemists, the Government should be asked to open a special practical class for the study of Chemistry,

- and students may be provided with scholarships and grants given for original research work in the college. The colleges should also be fitted up for such work, or else a laboratory should be established in some central place to enable students to go there as scholars and continue work with prospects of employment in the practical lines." (*Babu Gopal Chandra Banerji*, pp. 339-40.)
 - 94. "To start at once a Chemical Laboratory costing not more than Rs. 10,000 to start with, with the express purpose and direct aim of investigating, analysing and definitely determining the economic value of various raw materials of India which are available under the present circumstances, described in Watt's *Dictionary of Economic Products of India* and the *Economic Geology of India*." (*Mr. Puran*, pp. 331-2)
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• E.—Organization of Capital.

- 95. Urban Banks to be started on the co-operative principle for small traders and officials, the provident fund for employés in offices and houses of business, the association of small producers with the object of placing their products on the market. (*Mr. J. Hope-Simpson*, p. 65.) For the benefit of the vast population of working men whose wages seldom admit of their having any surplus in hand above their daily wants," Co-operative Credit Societies should be started. (*Mr. Reginald Murray*, p. 263.)
- 96. "The Conference can best serve its object by undertaking the provision, on a small or large scale, of facilities for the aggregation of capital. The formation of a Bank or Banks, is an object worthy of its aspiration." (*Mr. K. Natarajan*, pp. liv—lv.) "For the organization of this system the form of financial concern which has best proved its soundness is the Joint Stock Bank." (*Mr. Reginald Murray*, p. 258.)

Resolutions passed at the First Indian Industrial Conference held at Benares on Saturday, the 30th of December, 1905.

I.

Resolved—That this Conference urges the Government of India and all Provincial Governments and administrations, and also the people of India according to their opportunities,—

- (1) To found technical schools in all large centres for the industrial education, on an adequate scale, of the Indian people ;
- (2) To encourage and help Indian manufactures ;
- (3) And to foster and extend the use of such manufactures in India in preference to foreign goods.

[Proposed by the Hon'ble Munshi Madho Lal (Benares), seconded by Mr. A. Chowdhri (Calcutta), supported by Mr. N. Subbarao (Rajahmundry), and carried unanimously.]

II.

Resolved—That this Conference urges all Provincial Governments and administrations as well as the proprietors and managers of private schools and colleges to add commercial classes, and industrial classes like those of weaving, dyeing, carpentry, etc., to the existing educational institutions, where practicable.

[Proposed by Mr. G. Subramania Iyer (Madras), seconded by Mr. Ali Mohamed Bhimji (Bombay), and carried unanimously.]

III.

Resolved—That this Conference specially invites the attention of Indian capitalists to the great importance of introducing the use of improved hand-looms among the weavers of India, and recommends the establishment of weaving schools, where boys may learn the use of such looms, with a view to their more extended use among the towns and villages of all Provinces in India.

[Proposed by Mr. Prabhas C. Mitra (Calcutta), seconded by Mr. Babulal Govilla (Aligarh), supported by Mr. Fazlal Husain (Aligarh), and carried unanimously.]

IV.

Resolved—That this Conference urges Indian capitalists to establish at their own cost schools for spinning, dyeing, pottery, carpentry, and the manufacture of ironware and brassware, in order to afford facilities to boys of all castes and classes to learn such useful industries as a means of their livelihood.

[Proposed by Rai Bahadur Lala Baij Nath (Allahabad), seconded by Mr. Rambhaj Dutt Chowdhri (Lahore), supported by Mr. S. R. Das (Calcutta), and carried unanimously.]

V.

Resolved—That where it is possible to raise large funds for industrial education, this Conference recommends the placing of such funds in the hands of trustees with a view to the establishment of Technological Colleges on the most modern methods adopted in Europe, America and Japan, for the training of large numbers of students in the various industries which are profitable in India.

[Proposed by Sir Bhulchandra Krishna, Kt. (Bombay), seconded by Rai Saheb Lala Girdhari Lal (Delhi), supported by Mr. Sukhbir Singh (Muzaffarnagar), and carried unanimously].

VI.

Resolved—That Provincial Committees be established at Calcutta, Bombay, Madras, Allahabad, Lahore and Nagpur for giving effect to the above recommendations, generally encouraging industries and making an industrial survey in their several provinces, and compiling useful facts and suggestions for submission to the next Industrial Conference in December 1906. In order to carry out these views each Committee is requested to raise suitable funds, appoint trustees, frame rules for the conduct of business and lay its accounts before the next Industrial Conference.

That the following gentlemen, with power to add to their number, be the members of the Committees for the year 1906 :—

CALCUTTA.

T. Palit, Esq.

The Hon'ble Mr. J. Chaudhuri.

R. N. Mukerji, Esq.

BOMBAY.

D. E. Wacha, Esq.

The Hon'ble Mr. Vithaldas Damodher Thackersey.
Lalubhai Samaldas, Esq.

MADRAS.

N. Subbarao, Esq.

The Hon'ble Mr. L. A. Govindaraghava Iyer.
V. Krishnaswami Iyer, Esq.

ALLAHABAD.

Rai Bahadur Lala Baij Nath.

The Hon'ble Pandit Madan Mohan Malaviya.

Munshi Ganga Prasad Varma.

LAHORE.

Rai Bahadur Lala Ganga Ram, C. I. E.

Shaikh Umar Bakhsh.

Lala Lajpat Rai.

Lala Harkishen Lal.

Lala Mulka Ram.

NAGPUR.

G. S. Khaparde, Esq.

Rao Bahadur R. N. Mudholkar.

M. V. Joshi, Esq.

[Proposed by Lala Lajpat Rai (Lahore), seconded by Rai Bahadur Lala Ganga Ram, C. I. E. (Lahore), supported by the Hon'ble Mr. L. A. Govindaraghava Iyer (Madras), and carried unanimously.]

VII.

Resolved—That this Conference appoints Mr. R. N. Mudholkar as General Secretary, empowers the President to appoint a permanent Assistant Secretary and establishment on suitable pay, and allots a sum of Rs. 5,000 for meeting the expenses for the next twelve months.

[Proposed by the Hon'ble Pandit Madan Mohan Malaviya (Allahabad), seconded by Mr. C. Vijayaraghava-chariar (Salem), and carried unanimously.]

REPORT OF THE FIRST INDIAN INDUSTRIAL CONFERENCE.

The First Indian Industrial Conference was held in the Congress *Mandap* at Benares at 1 p. m., on Saturday, the 30th December, 1905. There was a large gathering of delegates and visitors belonging to the different provinces of India. The Conference was opened by the Hon'ble Munshi Madho Lal, Chairman of the Committee, who delivered the following speech :—

Mr. Dutt, Delegates to the Industrial Conference, Ladies and Gentlemen,

I beg to welcome you all to this, the First Indian Industrial Conference, which the Exhibition Committee has ventured to organise. When we began to make arrangements for holding the Exhibition, it struck me that it would be useful to invite competent gentlemen interested in the industrial movement to read short papers on important subjects bearing on the development of Indian industries. The same idea suggested itself to some of my friends on the Exhibition Committee, and took shape in this Conference. We were careful, however, not to take any definite steps before consulting the leaders of the Congress movement in the different provinces. With a very few exceptions they agreed with us that we should hold such a Conference. If I may be permitted to refer to any of the letters we received in reply to the circular of the Exhibition Committee, a selection from which will be published in the Report of the Conference, I will invite your attention to that of Dr. Rash Behari Ghosh, who thought it almost useless to hold Exhibitions which were not followed by Conferences of this character. We were fortunate in securing you, Sir, as the President of this, the first Industrial Conference. We are deeply indebted to you for your kind

courtesy in readily accepting our invitation and in coming down here all the way from Baroda to guide its deliberations. As Mr. Dadabhai Naoroji, who has sent us a message of hope and sympathy quite characteristic of him, has remarked, a movement which starts under your auspices is bound to bear good fruit. But I will not take up any time in painting the lily white, nor do I intend to make any lengthy remarks on the objects of this Industrial Conference.

I feel it my duty to express my sense of obligation to all those gentlemen, our own countrymen as well as our European friends, who have encouraged and assisted us in our work. Among the former must be specially mentioned our good friend, Mr. Mudholkar, who is well-known for his constant anxiety to promote the welfare of his countrymen. Among the latter I desire to bring to your notice eminent names, such as Lord Reay, Sir Horace Plunkett, Sir Frederick Lely, Sir Frederick Nicholson, Sir Thomas Wardle, Sir Guilford Molesworth, Mr. H. J. Tozer, Sir Henry Cotton, our illustrious friend Mr. A. O. Hume, and many others, to one and all of whom we are under heavy obligation. Two of them, Mr. T. H. Holland and Mr. J. Hope Simpson, are here, and I tender a cordial welcome to them. With your permission, I will mention the letter we have received from Lord Reay in which his lordship expresses the hope that this Conference may lead to the industrial survey of India and to the further promotion of technical instruction. "For the proper development of the vast resources of India," Lord Reay says, "and the prosperity of those engaged in industrial and commercial pursuits as well as in agriculture, systematic training is an imperative necessity."

Gentlemen, there is another very encouraging fact in connection with this Conference which it is my duty to bring to your notice. The Secretary to the Government of India in the Department of Commerce and Industry has kindly written to say that he will "watch the proceedings of the Conference with interest and shall be glad to put before Government any information they may wish to give on the subject of

industrial improvement or any measures they may indicate as likely to have a practical result in this direction." It is hardly necessary for me to say that you will of course take full advantage of this sympathetic assurance.

I now beg to propose that Mr. R. C. Dutt be elected President of this Conference. (Loud cheers.)

Mr. D. E. Wacha of Bombay seconded the proposition and spoke of Mr. Dutt's great abilities and patriotism. It was their good fortune that the First Indian Industrial Conference was to be presided over by so distinguished a man. (Cheers.)

The proposition having been carried by acclamation, Mr. Dutt was installed in the Presidential chair and he then delivered the following address :—

THE PRESIDENTIAL ADDRESS.

You have done me high honour by selecting me President of this First Industrial Conference held in India in connection with the National Congress. Impressed with the growing need for the expansion of our industries, that great and representative body has held an Industrial Exhibition from year to year; all classes of manufacturers, European and Indian, have sent in their goods to these Exhibitions; and the Government of India and Provincial Governments have generously helped and fostered their growth. This year, you have taken a new departure; you have felt that beyond exhibiting our goods we might, as practical men, compare notes with each other in reference to the various industries with which we may be familiar; and you have resolved therefore to hold an Industrial Conference as a necessary adjunct to the Industrial Exhibition. For the rest, the object of this Conference is the same as that of the Industrial Exhibition, viz., the promotion of Indian Industries. We meet here to-day, not to discuss political or social questions, but purely industrial questions; and we invite practical suggestions from practical men of all classes,—Hindu and European, Mahomedan and Parsee,—who are familiar with various Indian trades and industries.

Two extreme views : the truth lies midway.

Gentlemen, there are two extreme views often expressed about our Indian industries, both of which I believe to be wrong. One is a despondent view,—a cry of despair,—that Indian industries have no future against European competition, and that India is sinking lower and lower as a purely agricultural country. The other is a roseate view,—that the trade of India is increasing by leaps and bounds under the British Rule, and that the increasing figures of Indian imports and exports are an index to the growth of Indian manufactures and of the prosperity of the people. I have seen the first view,—the despondent view,—expressed in its extremest form in our Indian newspapers. And I have heard the second view expressed in meetings held in London by Englishmen, who naturally take the trade figures as an index to the prosperity of a nation.

As usual, the truth lies midway. We are beset with grave difficulties, but we have no reason to despair. Our industrial condition in the present day is lamentable, but it is not hopeless. We have to face a severe, and in some respects an unequal, competition, but our future is in our own hands if we face our difficulties like men. Let us, to use an expressive phrase of Dr. Johnson, clear ourselves of cant; let us examine our position impartially and soberly as practical men.

Our difficulties are of a two-fold nature. In the first place our old industries have undoubtedly declined, and we have to recover lost ground. In the second place we have to recover our position under exceptional economic conditions which few nations on earth have to face. Our two difficulties may be briefly described thus:—Firstly, other competitors have got the start of us ; and secondly, we are unfairly handicapped in the race.

Our first difficulty.

It would serve no useful purpose to narrate at length the manner in which our old industries have declined in a competition which was not altogether fair. I have written largely on this subject in my published works, and may only

briefly refer to a few facts to-day. For many centuries past, the manufactures of India were prized in the markets of Europe and Asia; and Arab and Portuguese merchants, Dutch and English traders, shipped large consignments of Indian goods to various ports in the world. In those days there was no thought of repressing Indian industries; on the contrary it was the interest of the foreign traders to foster them, as far as it was in their power to do so, because the excellence and the largeness of Indian manufactures were the sources of their own gain and profit.

But when England acquired political power in India in the middle of the eighteenth century,—this policy was reversed. Englishmen were manufacturers themselves, and it was their policy in those days to repress the manufactures of their own Colonies in order to promote their own. The same policy was unfortunately pursued in India; and, for the first time in the history of India, her manufacturing industries were discouraged, instead of being encouraged. The export of Indian manufactures to Europe was repressed by prohibitive duties, and the import of English manufactures into India was facilitated by the levy of almost nominal duties. The idea was to make India a country of raw produce for the promotion of English manufacturing industries. The British manufacturer, in the words of the historian H. H. Wilson, "employed the arm of political injustice to keep down, and ultimately strangle, a competitor with whom he could not have contended on equal terms."

Among all the Indian industries of the eighteenth century, the textile industry was the most extensive; and the invention of the power-loom in England completed the ruin of that industry which a system of unfair tariffs had begun. I do not wish to place before you elaborate statements to-day, but a few figures, showing the decline of our cotton manufactures in the first quarter of the 19th century, have a melancholy interest.

The export of cotton piece goods from Calcutta to the United Kingdom was over 6,000 bales in 1801, over 14,000 bales in 1802, and over 13,000 bales in 1803; it never reached

a thousand bales after 1826. The export of the same goods from Calcutta to America was over 13,000 bales in 1801 ; it dwindled to less than 300 bales by 1829. Denmark took over 1,400 bales in 1800, but never took more than 150 bales after 1820. Portugal took nearly 10,000 bales in 1799, but never took over a thousand bales after 1825. And the exports to the Arabian and Persian Gulfs, which rose to between four and seven thousand bales between 1810 and 1820, never exceeded 2,000 bales after 1825. The export of cotton piece goods from Calcutta to the different countries of the earth practically disappeared within the first quarter of the nineteenth century, and what was true of Calcutta was true of every other part in India.

It is needless to say that, while the export of cotton goods from India declined, the import of cotton goods into India from Europe rose by leaps and bounds. By 1858, which was the year when the late Queen assumed the direct administration of India, the value of cotton goods imported into India had reached nearly 5 millions pounds sterling. By 1877, which was the year when Her Gracious Majesty assumed the title of Empress of India, the value of the cotton goods imported into India had reached nearly 16 millions sterling. This steady increase in the import of cotton piece goods is often quoted as a mark of India's increasing prosperity. But is there any practical man in India who does not see in these figures the decline of the most extensive of Indian industries, and therefore a loss in the wealth of the nation ? I will not dwell longer on this point ; I have said enough to shew how we have lost ground in the past ; I will now turn to our second difficulty, the economic conditions which we have to face in our endeavour to recover our position.

Our Second Difficulty.

Gentlemen, we will not consent to see our country made a land of raw produce, or a dumping ground for the manufactures of other nations. I do not believe a country can permanently prosper by agriculture alone any more than a country can permanently prosper by manufactures alone ;

the two must thrive side by side to give employment to the population of a country. I do not envy the position of England to-day which has so far neglected her agriculture as to be dependent on foreign nations for her food supply; that state of things cannot last for ever. On the other hand I do not appreciate the position of our own country which is dependent on foreign countries for most of the manufactured articles required for daily use. We must rescue her from that unhappy position, but in order to do so, we must clearly see and understand the difficulties we have to face.

In the first place we have to change an ancient and time-honoured habit, the habit of carrying on our industries in our homes and cottages. India is a country of cottage industries. Each agriculturist tills his own little field, pays his rent, and transmits his holding to his son. Each humble weaver, with the aid of his wife and children, adjusts his warp and works his loom. I am myself {partial to this cottage industry. The tillers of the soil, who own their little plots of land from generation to generation, are more dignified beings than the labourers who live on their landlord's vast estate, and earn only the wages of labour. The humble weavers, working with their wives and children in their homes, live better and more peaceful lives than men and women working in crowded and unwholesome factories. The dignity of man is seen at its best when he works in his own field or his own cottage,—not when he is employed at a part of a vast machine which seems to crush out all manhood and womanhood in the operatives. I have seen many of the largest cotton mills of Lancashire, and the thousands of factory lads and factory girls employed there; and I would not like to see any very large proportion of our labourers so employed. And those who ought to know tell us that the fresh air of the country is the best suited for building up strong constitutions, and that a race deteriorates when it neglects rustic industry and lives mostly in towns. But nevertheless, while we may avoid the mistake of sending all our population to towns, we must at the same time learn to create large centres of industry in towns. We

must change our old habit of universal cottage industries, and learn to form Companies, erect Mills and adopt the methods of combined action, if we desire to protect or revive our industries.

But the formation of Companies and the erection of Mills requires capital, and the conditions in India are not favourable to the accumulation of capital. I do not wish to travel into political subjects to-day, but it is necessary to mention, what is known to every one of you, that the sources of wealth in this country are not as broad and spacious as in happier countries. Our land is more heavily taxed than it is in England or America or Japan, and the land-tax in most Provinces is enhanced at each recurring Settlement. Our revenue is not all spent in India, a large portion of it is remitted for Home Charges year after year. And the highest and most lucrative appointments in the Empire are not open to us. All these facts tell against the accumulation of capital needed for large enterprises, and our moneyed men are poor compared to those in other lands. A man owning half a lac of rupees is considered a rich man in India; while a man with only three thousand pounds in funds would hardly be deemed to have a decent competence in England.

Lastly, there is the difficulty about our fiscal legislation which is oftener controlled by Lancashire than by us in this country. You all remember how Lord Lytton's Government was compelled to repeal the import duties on cotton goods against the advice and the vote of every Member of Lord Lytton's Council except Sir John Strachey and the Military Member. And when the import duties were reimposed, you remember how Lord Elgin's Government was compelled to impose an excise duty on the mill-produce of India to conciliate Lancashire. I know of no act in modern fiscal legislation more unwise and hurtful to an infant industry than the imposition of an excise tax, unknown in any civilised country. And I know of nothing more humiliating to the Government of a great Empire like India than the correspondence which you will find recorded in Parliamentary Blue Books, leading to these fiscal changes.

How we have faced these difficulties.

These, then, are the difficulties before us. In the first place, we have lagged behind, and have to recover lost ground. And in the second place, we have to run the race with the triple disadvantage of want of modern industrial training, want of capital, and want of control over our own fiscal legislation. I mention these difficulties not to discourage you, but because we have to face and conquer them. Few countries on earth would have succeeded under these difficulties, but I have faith in the capacities of our nation, in the patience and skill of our artisans, in the adaptability of our race to new methods, in the resources of this wonderful land, and in the advantages of cheap labour. I have been something of an optimist all my life; I think it better to fight and to fail than not to fight at all; but in this industrial movement I believe we are destined to fight end to conquer. I have no patience with those of my countrymen who throw up their hands in despair, and declare that all is lost! The history of the last twenty or thirty years shews that all is not lost, and that much has been gained.

Turning once more to the cotton industry, you are aware that we have adopted the power-looms invented in England, and have started mills in Bombay, in Nagpur, and in Ahmedabad, which are yearly increasing in number and in business, and promise in the near future to supply to a large extent the requirements of India. The hand-loom has not yet died out in India, and is not destined to die out; under the improvements effected by such friends and well-wishers of India as Mr. Chatterton, Mr. Churchill, and Mr. Havell, it has more than doubled its out-put and promises to hold its own yet in the villages and rural tracts of India. Sericulture and silk weaving are on the increase, and the demand for Indian silk is increasing in India from year to year. Woollen mills have been started in the Punjab and Northern India by enterprising Englishmen, whom I reckon among our true benefactors; and the woollen stuff which most of you are wearing to-day, and which I wear to-day, have been manufactured in India. Jute industry is increasing

in Bengal by leaps and bounds, and before long jute will largely enter into fabrics woven in India. The aluminium industry is a new invention which has a great future; and the enamelled ironware of Europe will never replace our brass and copper articles, the use of which is rather on the increase than decreasing.

Lastly, coal and iron, which are the most effective means of extending all modern industries, are being worked in increasing quantities from year to year, and new iron ores have been discovered in Orissa which promise the most favourable returns. The possibilities of electricity being employed in manufacturing industries are also as great in India as in any country.

The figures given below shew that the production of Cotton and Woollen goods has increased nearly a hundred per cent., and fifty per cent., respectively, in recent years :—

	1896-97.	1904-05.
	lbs.	lbs.
Cotton goods	82,933,000	158,747,000
...		
	1894.	1903.
	lbs.	lbs.
Woollen goods	1,657,000	2,977,000
...		

Gentlemen, these are some of the results which we have achieved in recent years, and all classes of men, Hindu and Musalman, Englishman and Parsee, have helped in the onward march. I make bold to say that no other country in Asia, except Japan, has shewn such industrial progress within the lifetime of a generation; and no country on earth, labouring under the disadvantages from which we suffer, could have shewn more adaptability to modern methods, more skill, more patient industry, more marked success.

The Swadeshi Movement.

And now, at the commencement of the Twentieth Century, we are more resolved than ever not to be beaten in this industrial race. I see in the faces of those who fill this hall to-day a strong determination that—God helping—we will

work out our own salvation by our own hands. Men educated in English Schools and Colleges in India, men trained in the Universities of Cambridge and Oxford, have come to share this noble work with practical manufacturers and traders in India. And to-day there is a desire which is spreading all over India, that by every legitimate means, by every lawful endeavour, we will foster and stimulate the use of our own manufactures among the vast millions who fill this great Continent.

Gentlemen, I am drifting into a subject which has raised much angry discussion when I speak of the Swadeshi Movement. And yet I would not be fulfilling the duty which you have imposed upon me to-day, if I passed silently over that subject which is in every man's thoughts. I speak in the presence of some who are among the leaders of this movement in Bengal, and I speak from personal knowledge when I say, that these leaders have tried their very utmost to conduct this movement lawfully and peacefully, to the best interests of the people and of the Government. If there have been any isolated instances of disturbance, here and there, we deprecate such acts. On the other hand, if the Government have, in needless panic, been betrayed into measures of unwise repression, we deplore such measures. But neither the rare instances of disturbance, nor the unwise measures of repression, are a part and parcel of the Swadeshi Scheme. The essence of the scheme, as I understand it, is, by every lawful method, to encourage and foster home industries, and to stimulate the use of home manufactures among all classes of people in India. Gentlemen, I sympathise with this movement with all my heart, and will co-operate with this movement with all my power.

Gentlemen, the Swadeshi Movement is one which all nations on earth are seeking to adopt in the present day. Mr. Chamberlain is seeking to adopt it by a system of Protection, Mr. Balfour seeks to adopt it by a scheme of Retaliatory, France, Germany, the United States, and all the British Colonies adopt it by building up a wall of prohibitive duties. We have no control over our fiscal legislation,

and we adopt the Swadeshi Scheme therefore by a laudable resolution to use our home manufactures, as far as practicable, in preference to foreign manufactures. I see nothing that is sinful, nothing that is hurtful in this; I see much that is praiseworthy and much that is beneficial. It will certainly foster and encourage our industries in which the Indian Government has always professed the greatest interest. It will relieve millions of weavers and other artisans from a state of semi-starvation in which they have lived, will bring them back to their hand-loom and other industries, and will minimise the terrible effects of famines which the Government have always endeavoured to relieve to the best of their power. It will give a new impetus to our manufactures which need such impetus; and it will see us, in the near future, largely dependent on articles of daily use prepared at home, rather than articles imported from abroad. In one-word, it will give a new life to our industrial enterprises; and there is nothing which the people of India and the Government of India desire more earnestly than to see Indian industries flourish, and the industrial classes prosper.

Therefore, I sincerely trust that the Swadeshi Movement will live and extend in every Province and in every village in India. There should be Associations formed in every District to extend and perpetuate this movement, and to stimulate the use of country-made cloth and country-made articles, not only in towns, but in rural villages. Such Associations should peacefully and quietly extend their operations from year to year, disregarding the jeers of their critics, and braving the wrath of their opponents. Spasmodic and hysterical exhibitions should be avoided, for, as a great English writer remarks, strength consists not in spasms but in the stout bearing of burdens. Mindful of the great work we have to perform, we should work with the calm consciousness of doing our duty towards our countrymen. If we succeed in this noble endeavour, we shall present to the world an instance, unparalleled in the history of modern times, of a nation protecting its manufactures and industries without protective duties. If we fail in this great

endeavour, and prove ourselves false to the resolutions we have formed and professed, then we shall deserve to remain in that state of industrial serfdom to other nations from which we are struggling to be free.

Progress of Industries in Native States.

And now, Gentlemen, in concluding my remarks to-day, I think I should say a word or two about the progress of industries in Native States, which are not by any means backward in comparison with British Provinces. You have heard of the great endeavours made in Mysore to foster industries in all directions by modern methods. You have heard of the growing silk industry of Kashmir, and of the many flourishing industries of other States in India. And you have probably heard something also of the State which I have, at present, the honour of serving.

Gentlemen, the State of Baroda has the good fortune of being ruled by one of the most enlightened Princes in India. And no part of his administration receives his more earnest attention than the fostering of industries in the State. Over twenty years ago, when the people of Baroda scarcely knew the value and importance of cotton mills, His Highness the Gaekwar of Baroda started a State Mill to educate the people by an object lesson, as it were. And now that the importance of cotton mills is so largely appreciated, the Maharaja has transferred the State Mill into private hands in order to foster private enterprise. Nor is he disappointed in his anticipations ;—the success of one mill under private ownership has encouraged other capitalists ; new companies have been formed and new mills are starting into existence ; and before long we hope to be able to supply the needs of a large portion of the people of Baroda, and outside Baroda.

Hand-looms still have a great future, and the Gaekwar of Baroda has established a school of weaving which teaches the use of improved hand-looms, brought from Bengal, from Ahmednagar and elsewhere, to a large number of students. It is hoped that these weaver boys, when they have learnt

the lesson, will introduce the improved hand-looms in their own villages, and in all weaving centres.

We have a Technical Institute which teaches mechanical industries to all classes of students. The success of this institute is so pronounced that the Government of the Central Provinces of India grants scholarships to boys of those Provinces to proceed to Baroda and learn industries there.

One Baroda student, educated at this Technical Institute, has started a dyeing factory which sends out large quantities of dyed cloths to all parts of India, and even to Rangoon. Another Baroda man, educated in Europe, has started a chocolate factory which, I hope, will soon send delightful little packets to little children in all parts of India. And an ingenious District Officer in Baroda, who also received his education in Europe, has been successful in the preparation of cigarettes from Baroda tobacco, and is now busy with the manufacture of matches,—I suppose for lighting his own cigarettes!

Gentlemen, those of you who have been over the Exhibition grounds will have seen some Baroda girls who are making laces for use by our Indian ladies. And when I add that students have been sent, this year, from Baroda to Europe, to America, and to Japan, at State expense, to learn different industries, you will admit that the quiet, retiring, and silent worker, who rules Baroda, is not the least earnest and patriotic among the many earnest and patriotic men, who are devoting themselves to-day to foster and revive the industries of India. (Loud and long continued cheers.)

After the delivery of the Presidential address papers on subjects bearing on the industrial development of India were read. These are printed in the following pages.

Papers prepared for and read or taken as read at the
Conference.

INDIAN AGRICULTURE.

BY D. M. HAMILTON, ESQ., *Senior Partner of the Firm of Messrs. Mackinnon Mackenzie & Co., and sometime a Member of the Governor-General's Legislative Council, Calcutta.*

GENTLEMEN,—When you asked me to write a paper on the agricultural development of India, for the Benares Industrial Conference, I hesitated to do so for this reason among others, that my knowledge of the subject is more general than particular, and I seemed to have elsewhere exhausted all I had to say. On second thoughts, however, and at your urgent repeated request that I should not fail you, it seemed to me that I might venture to reiterate what I had previously tried to impress upon the public attention, more particularly when, at a time like the present, the public gaze is so fixed upon Swadeshi manufacturing industries that the all-important fact is apt to be lost sight of, that Swadeshi manufactures are themselves almost entirely dependent for their success on the success of agriculture. That this is so, will at once be apparent when it is realised that the manufacture of Swadeshi piece-goods can only be successfully established when it has been found possible to grow suitable cottons; and I may also add in passing, that when the growing and manufacturing problems have been solved, the question of markets will be found also to depend on agriculture, for the simple reason that the great market for piece goods is the agricultural population, and the more flourishing that population is, the more can it afford to

spend on manufactures. It hardly seems necessary to mention such self-evident propositions, but when the voice of the multitude of counsellors is as the voice of many waters, it is perhaps well to call attention afresh to the "still small voice" of first principles. I might also here remind you that when you have captured the whole of the Manchester and Dundee cotton and jute industries, you will have converted into manufacturers only one million of the 300 millions of India. When the healthy cotton smoke of Bombay has become still more dense, and when you have doubled the jute mills which now adorn the banks of the Hooghly, you will still have to provide for the 299 millions that remain. When you have enriched your country by transferring some crores of rupees from the pockets of Bengal to the purses of the men of Bombay; when you have had your little gamble and your money has changed hands and added to the wealth of your country as the money does which passes on the race-course, you will still have 90 per cent. of your countrymen appealing to you for help, and how are they to get it? There is only one way, and that is, by increasing the produce of their fields, and this can only be done by providing them with cheap money and by improving their methods of cultivation. India's economic problem can be briefly stated thus—What are the wants of her people? They are these:—

Food,
Clothing,
Housing,

and these three are one—Agriculture, for even the roof over his head has to be grown by the cultivator. And the cultivator has to bear not only his own burden, but also, in a very real sense, the burden of the Empire. He it is who provides the produce to enable our merchants to trade; he it is who grows the cotton and the jute to run our mills; he it is who provides the bulk of the traffic for the Railways, and fill the steamers with the rice, the linseed, the jute and the indigo, the hides and the tea; he it is who brings the piece-goods from Europe; he it is who pays the land revenue

and the army, and grows the income of the Zemindar ; he it is who grows the opium and pays the bulk of the salt tax ; even the mineral industry depends on him, for the coal is wanted to run the trains and the steamers which carry the produce of the soil. The problems of India are undoubtedly the problems of Agriculture ; anything, therefore, which advances Agriculture, advances the Empire.

Every one interested in India, and who is not, must be gratified to find Government taking a great step forward in providing India with the best that can be had in scientific agriculture. Rs. 20 lacs a year are promised, with more if necessary, and we cannot err in having too much for so beneficial and reproductive a purpose. It now rests with the leaders of the people to link up the training offered by Government with the practice of the people, and what is the link now missing ? Lord Curzon the other day remarked that the first condition of progress in general was money, and he was right. The progress of India, like that of every other country, depends on how its industry is financed, and it is here, unless some system more satisfactory than that on which the great industry of the country now rests can be devised, that India will come to a standstill. If the great body of cultivators have to work, not so much for themselves as for their creditors, why should they take the trouble to assimilate new methods of agriculture. They will not do it. To get them to do it, you must make it worth their while, for none of us care to work for nothing. The first thing to be done, therefore, is to get Indian Agriculture put on a satisfactory financial basis. Can this be done ? I do not see why it should not, and I do see that unless it is done, India cannot progress as she otherwise would. The solution of the problem can be found only by experiment, and it does not much matter if most of the experiments fail provided the way is found in the end. Various remedies have been put forward from time to time ; for example, the Hon'ble Mr. Gokhale recommends the buying up of the cultivator's debts by Government and so starting him with a clean sheet. With surpluses in hand

I see no reason why this should not be tried experimentally in one or two districts, for as I have said, it is only by experimenting in various directions that we shall ultimately find the way to success. Again, the Government of India, as appears from the recent resolution, is hopeful that by allowing the local Governments a freer hand in the working of the Agricultural Loans Act and the Land Improvement Act the people may be induced to take fuller advantage than they have hitherto done of the money which Government is willing to advance at $6\frac{1}{4}$ per cent. By all means let experiments be made in all directions, but I am just afraid that, while Government is willing to lend the money at $6\frac{1}{4}$ per cent., our old friend the middleman, from the chuprassie upwards, will find ways and means of defeating the beneficent aims of Government by insisting on another 10 per cent. for himself. My own feeling is that success is more likely to be found in the development of the co-operative principle, where the people will work together and leave no room for the middleman to come between, and I should like if a few zemindars who do not mind risking Rs. 1,000 to Rs. 2,000 only, would join me in experimenting on co-operative lines with the help of the Government registrars, and with grain banking as a basis from which to start. The undernoted memorandum,* written a short time ago, will explain what I mean.

* MEMORANDUM.

1. No country can prosper whose chief industry rests on an unsound financial basis.
2. The Indian agriculturist, having to pay his Banker anything from 25 to 100 per cent. for accommodation, cannot keep pace with his brother cultivators of other countries who pay only 5 to 10 per cent.
3. A Western system of banking, in which the Bank deals direct with the cultivator, is impossible in India, where the loans are so small and the cultivators are numbered by the hundred million. The village or a village society must therefore be the unit which borrows from the outside capitalist.
4. The question then arises what security can a village offer for capital so borrowed.
5. A possible answer to this question may be found in the Dharmagola system of grain banking as instituted by Rai Parvati Saukar Chowdhri, to whose philanthropic enterprise is due the credit for the Dharmagolas now successfully working.

I realise, however, that business cannot depend on charity for capital ; if we are to solve the question of rural finance it must be done as a business, not as a charity, but how is the enormous capital required to be found, for capital is shy of new ventures. Something in the nature of a Government guarantee will, I think, be both necessary and advisable. What I have to suggest, therefore, is (if the foregoing experiments should be carried out and should show indications of success,) that

- (1) The zemindars or other gentlemen of influence in the districts should join together and form themselves into district cash or grain Banks, and should at the same time take steps to organize co-operative credit societies in the villages on their properties ;
- (2) These co-operative credit societies should, to begin with, confine themselves to the lending of seed grain—the seed grain to be found by the zemindari district banks and to be advanced to the co-operative societies at 6 or 7 per cent. interest (cash transactions to be added later) ;
- (3) Government should guarantee 3 per cent. on the capital advanced to the villages by the district banks—the difference between 3 and 6 or 7 per cent. being the inducement for the zemindar to push the business.

6. In the Dharmagola system the grain capital which accumulates so rapidly at interest would form an excellent security with which to commence drawing capital from outside.

7. The Dharmagola might be registered under the Co-operative Credit Societies Act, in which case the members would be jointly and severally responsible for the money so borrowed, thus providing additional security, if such were considered necessary.

8. It would be advisable, if possible, to get the villagers to contribute the grain capital necessary to set the Dharmagola a-going, as they would then take a keener interest in it. Failing the villagers, the Zemindars might join with me in providing experimentally say 100 maunds (or more if required) of grain capital for 100 villages.

10. The grain would be lent out for the season at the usual seed grain rate of 45 to 50 per cent. interest, the profit with the original capital being dumped into the Gola for the benefit of the village,—the advance to be at our risk and to be repaid with 6 per cent. interest as circumstances permit.

Let Government lay aside a lac or two of rupees for guaranteeing experiments of this kind and see how the idea is likely to take. If successful, the money would never be asked for. Government now give away crores of rupees in the remission of land revenue and the writing off of agricultural loans, and it would perhaps be a truer charity if they were to risk something in an experiment which, if successful, would tend to create that spirit of self-help and trust between man and man which is so sadly wanting in India at the present time, and the absence of which so retards the economic and social advance of the country. If the experiment proved a success it would eventually result in a great saving to Government, for when the question of rural finance is solved we have solved the famine problem.

The Organization of Agriculture is a matter which is daily receiving more and more attention in all civilised countries, and the greatest measure of success would appear to be attained in those countries where the co-operative principle is being developed. With the other nations of the world moving forward in the organization of their resources, India cannot afford to lag behind. Will the leaders of the people therefore come forward and help on the development of their country? With a soil which, taking it all over is, I believe, as fertile as that of the great majority of countries, the Indian cultivator should, in proportion to his holding, be among the wealthiest in the world, for while his land is fertile, his requirements are few, and his balance therefore ought to be large. Even in the districts where rainfall is scanty there are many products which would serve as a stand-by in times of scarcity. Take, for example, the date sugar

11. When the villagers thus see with their own eyes that the profit belongs to themselves they will realise the advantages of co-operation and may be induced to extend the system to their general financial requirements.

12. The Dharmagola might in time be developed into a village grain store in which the villager could deposit his crop and draw advances thereon at a reasonable rate of interest, instead of, as he now does, throwing his entire crop in a lump on the market or into the hands of the friendly Bunia, and getting the low price which must result from the whole of the crop being dumped on the market at one time.

trees which are now running to waste by the million in Central India. There you have the raw material of genuine Swadeshi sugar to be had for the lifting, and yet none of the leaders of the people appear to be sufficiently interested in their poorer countrymen to show them how to tap the trees. I am safe in saying that in no other country would resources of this nature be left lying unused as they are in India. If the men who are so fond of talking about "the bread problem" would respond to the cry of their country for food, with something more satisfying than eloquence, India would be further ahead than she is to-day. It is to be hoped, therefore, in the interests of all concerned, that the beneficent efforts now being put forward by Government to develop the agricultural resources of the country will meet with the response which they deserve. The Agricultural Colleges and the Demonstration and Seed Farms which are now about to be established all over India if taken advantage of in conjunction with a sound system of finance, will make the rich richer, and ease the burden of the poor. Who will help the man with the hoe?—

Bowed by the weight of centuries, he leans
 Upon his hoe and gazes on the ground,
 The emptiness of Ages in his face,
 And on his back the burden of the world.

The foregoing remarks apply in the main to the Indian Agriculturist. Whether the principle of co-operation might not also be applied to European agriculture, such as that of Behar, is a question which might be worth considering. In Behar the agricultural industry has two of the main elements

13. Such advances on crops would be drawn from outside by the village society at say 6 per cent. and re-lent to the cultivator at say 10 per cent., the profit going to swell the Dharmagola's reserve and so enable it to draw further cheap capital into the village. This further capital might be utilised in paying off the old debts of the members, or otherwise as might be deemed advisable.

14. I understand that under clause 15 of the Co-operative Credit Societies Act grain capital deposited in a Gola registered under the Act cannot be attached by a creditor. This should prove a great incentive to the villagers to form themselves into Co-operative Credit Societies and to adopt the Dharmagola system, which, even if it developed into nothing greater, would still be a great boon to the cultivator.

of success, namely, plenty of good land and labour. The element chiefly wanting is finance. Would it not be possible for the planters to establish a Co-operative Banking system in which each man would be jointly and severally responsible for his neighbour, care of course being taken to see that only reliable men were admitted within the circle? Backed by a small Government guarantee the capital required for such a banking system should easily be forthcoming, and when so much money is being spent on the Army, Government might well be asked for a small share to help on the industry conducted by men who have a military as well as an industrial value. The Governments of other countries and also of the British Colonies give financial aid to agriculture, and it would be a great pity if the district in which Pusa is situated should not be able, owing to the want of capital, to take full advantage of the scientific research which Government is now about to offer; for without capital to apply it, science will be of no value.

INDIAN AGRICULTURE.

By LALUBHAI SAMALDAS, Esq., *Bombay*.

The vast importance of Agriculture in this country is evidenced by the fact that the agricultural population including both the actual workers and dependents is about* 65 per cent. of the total population. Agriculture thus supports some 19 crores of people in the whole of India including the Native States; and it well may be called the backbone of Indian industries. The diversion of the agricultural population to other industries has very often been suggested as one of the chief remedies to alleviate the sufferings due to recurring famines. This is true so far as it goes. But

* Lord Curzon in his last speech, while referring to his own work for the masses, spoke of the peasants as forming 80 per cent. of the total population. I do not know what authority his lordship had for making such a statement. I depend for my figures on the Statistical Abstract relating to British India from 1894-95 to 1903-04.

how small a percentage of the agricultural population can thus be diverted, will best be seen by studying the import figures of the chief article of import, *vis.*, cotton piece-goods and yarn. The amount of these imports in 1903-04 was worth 19 millions sterling, *i.e.*, about 29 crores of rupees. The number of persons employed in the Cotton Mills of this country in the same year was 186,271 and the production was 578,381,000, lbs. of yarn and 158,747,000, of woven goods. Taking the price of yarn at 3 lbs. a rupee and that of woven goods at 2 lbs. the average production per man comes to about Rs. 1,200. The cotton piece-goods proposed to be manufactured, to take the place of Manchester piece-goods, will have to be of finer counts, and will have in many cases to be bleached and dyed; the average production per hand will therefore be less. Taking it at, say, Rs. 1,000 per hand, the number of persons who will be supported by this new industry—if the whole imported amount were produced here—will be at the most 3 lakhs, or including the dependents 6 lakhs of people, *i.e.*, about $\frac{1}{3}$ per cent. of the agricultural population. Even granting that the starting of such industries will have other social and economical advantages and also that the persons employed therein may thereby gain higher wages than they used to get as agriculturists, it is rather wide of the mark to talk of this diverting of 3 lakhs of people—to take the instance of the most important industry—as having any determining effect on the general condition of the agriculturists. The comparative importance of agricultural industry can be estimated in another way also. The Land Revenue of the country was about 19 millions sterling in 1903-04. The incidence of land revenue to gross produce varies from 5 to 33 per cent. in different provinces. It would be fair to take the average at 10 per cent.; the gross produce from the land can be put down at 190 millions sterling.* If, by improving the methods of cultivation, the agriculturist can grow not the proverbial two blades of corn but merely a blade and a quarter instead of one, the country

* Mulhall puts it down at 300 millions sterling. If these figures are accepted, the case becomes much stronger.

on the whole will be richer by about 50 millions sterling, which is only a little less than the total imports of all articles into this country. Those who therefore want to see this country take its place amongst the civilized countries of the world should try their best to see that suitable improvements in the methods of cultivation are introduced and that the condition of the agriculturist is thereby bettered. That a

great deal remains to be done to improve

*Comparative low state
of Indian Agriculture.*

the methods of cultivation in this country can best be seen by comparing the

average production per man and per acre in India and in Great Britain. The total farming product in India has been put down by Mulhall at 400 million pounds; the agricultural population in 1891 was 172 millions; from which it would appear that the farm products average 46s. per head; say 10/- a year for each adult male peasant. In the United Kingdom it is 91/- per head. The high prices fetched by agricultural produce in that country may account for part of this difference but the rest must be due to the smaller production per acre. This is borne out by the fact that the produce of wheat was 9 bushels per acre in India while it was 32 in the United Kingdom. Making allowance for the differences in soil and climatic conditions, it must be acknowledged that part of this defect is due to inferior methods of

cultivation. India is said to be over-populated, and this is true so far as the

*The area under culti-
vation.*

productive area per head of the actual

population is concerned. While the cultivated area per inhabitant is more than two acres in other countries, in India it is one acre only. The utmost limit to which this can be extended is about 50 per cent. if all the culturable waste be brought under cultivation. The net area sown with crops does not show a marked increase during the last ten years. It was 196 millions in 1894-95, fell down to 177 millions during the famine year of 1896-97, came up to the former level in the next two years and again fell off to 180 millions in the famine year of 1899-1900. There has been a steady rise in the cultivated area thereafter, it being less marked in

the first two years following the famine year while it is more than 4 per cent. in the next two years. The most hopeful sign, however, is the increase of the area under irrigation from some 24 million acres in 1894-95 to about 34 millions in 1903-04.

A study of the estimated area under principal crops and their yield shows that while rice and wheat are sown in almost the same area, and indigo has suffered the most, the area under cotton cultivation has been steadily increasing. The same improvement is noticeable in the case of tea, while coffee shows a small falling off. The import duty on bounty-fed sugar which was expected by the Government of Lord Curzon to assist the indigenous sugar-cane plantation has had no such effect. On the contrary, the area under sugar-cane has gone down by some two hundred thousand acres. The effect of the two great famines is seen in the shortage of area under wheat in Bombay, Central Provinces, Berar, and Rajputana. In Bombay, wheat was grown in about 2 millions and a half of acres in 1892-93 and the following two years. In 1896-97 it was sown in only a million and a half acres, while in the great famine year of 1899-1900, the area went down to a million and a sixth. The yield per acre in that year was less than a half of what it is in an ordinary fair year. The area under wheat has slowly been increasing since then, but it is still, *i. e.*, in 1904-05, about half a million behind the maximum acreage of 1894-95. The figures of the Central Provinces tell the same tale ; while those for Berar are much more heart-rending. The area under wheat which was about a million acres in 1892-93, dwindled down to about 18,000 acres, *i. e.*, less than two per cent. of the former area in 1899-1900. The recouping process has set in, but even in the past year the area under wheat was only half of what it was in 1892-93. This is however partly due to the province having taken to cotton growing. In the Punjab and the North-West Frontier, though the area was reduced during the famine year, it has again reached the former high level, while the total yield—owing most probably to better irrigation facilities—has increased appreciably. Cotton, one of the

other staple crops, is gaining ground in the Punjab and the North-Western Frontier provinces where the area has almost doubled in the last decade and also in the Central Provinces and Berar. Bengal shows a steady falling off in cotton cultivation but that is compensated for by an increase in jute cultivation. The fate of indigo plantation, the area under which has fallen off to about two-fifths in the last decade, is one more proof of the apathetic attitude of Government towards agricultural industries. There is no reason why the artificial synthetic indigo should have driven the natural indigo out of the field, if the latter had at its disposal the same scientific knowledge that the former has had in Germany.

The first Famine Commission in their report say that "the defect in the efforts made by Government to instruct the cultivator has consisted in the failure to recognize the fact that in order to improve Indian agriculture, it is necessary to be thoroughly acquainted with it and to learn what adaptation is needed to suit modern and more scientific methods and maxims to Indian staples and climate." Mr. Wallace and Dr. Voelcker who came out as experts to study the condition of Indian agriculture and to make recommendations for improvements therein, laid stress on a systematic inquiry being undertaken "not in a hurried way but by patient watching and learning without which no really sound knowledge will be obtained, nor any great improvement be intelligently inaugurated." Partly on account of the vastness and complicated nature of the agricultural problem, partly on account of the hands of the local officers being full of routine and other work, partly on account of the want of sufficient funds for this work, partly on account of the feeling created by Dr. Voelcker's report that the Indian *raiyat* is quite as good and in some respects the superior of the average British farmer, but chiefly on account of the ease with which the land revenue was recovered, Government have been apathetic towards the wants of the agriculturists. The famine of 1899-1900 was an eye-opener to all. It was felt that if lacs of lives

The Necessity of Systematic Inquiry into the Methods of Indian Agriculture.

were lost merely on account of one famine year, there must be something radically wrong with the condition of the agriculturists ; and now after a lapse of some ten years since Dr. Voelcker submitted his report, there is prospect of such work being taken up by the provincial departments of agriculture in concert with the imperial experts and at the same time of the provincial departments being brought into closer touch with the agriculturists—at least, the Agricultural Board at their meeting held at Pusa in the beginning of this year have decided to adopt such measures.

The Hindu Law of Inheritance requiring a sub-division of the parental property into equal parts, is one of the chief causes of the smallness of the holdings in this country which constitutes a limit to the possibility of agricultural improvement. The Bombay Presidency, excluding Sind, is divided for revenue and administrative purposes into three divisions.

The Problem not merely an agricultural one but a social, economical and political one.

In the Northern Division, more than half the number of holdings are under five acres.

In the Central and the Southern Divisions where land is not as rich and fertile as in the Northern Division, the holdings are larger—the average acreage of a holding being 29 and 18 acres in the Central and the Southern Division, respectively, as compared to 10 acres in the Northern Division. With the increase in population there would be a greater sub-division of land, as ordinarily the agriculturist sticks to his land till he is driven away by circumstances, and then he usually degenerates into an agricultural labourer or emigrates to a city or town and becomes a mill-hand or an ordinary labourer. The social customs and habits prevent ready emigration from a thickly to a sparsely populated area and they also act as a deterrent to an agriculturist following any other calling than that of his father. If these barriers be broken and if facilities are granted for the shifting of population to places having large culturable wastes, pressure on land will be relieved in one quarter, while more land will be brought under cultivation in other quarters, and the total wealth of the country will be increased. The total irrigated area in

1903-04 was 34 millions of acres, out of the net sown area of 208 million acres ; that is in some 84 per cent. of the area under cultivation, the agriculturist can grow one crop and must depend upon the rains for getting his harvest. The greater facilities of irrigation therefore means dependence upon that uncertain factor—the seasonable fall of rains. The Irrigation Commission have come to the conclusion that no heroic measures are possible but that much good work can be done by providing well-irrigation. The first thing in this connection is to find out the presence and depth of sub-soil water. At present the cultivators depend in this matter upon persons who are reputed to possess the natural gift of finding out the presence of sub-soil water. That there are such men, I know from personal experience. They, however, do not disclose their methods. The more scientific method is, however, the test by boring apparatus; and the free supply of such apparatus in places where it is needed would prevent the waste of money in digging useless wells. In ordinary years, the agriculturist having no irrigation facilities has not to work for more than eight months a year while the females of the house have not to work for even that length of time. The rest of the time is passed by the family in practical idleness. If means can be provided by which they can do some work during this period and earn some extra money, their condition will be improved to that extent. The work must be such as will not be considered derogatory to the social status of the agriculturist and must not at the same time require an outlay of capital beyond his means. The small holdings in Gujerat have proved advantageous in one way. The proprietor is able to pay more attention to his small farm and as he has to obtain his living from the same, he is obliged to have recourse to high agriculture. As a result, they have reached such a stage of a careful cultivation as led Mr. Voelcker to say "certain it is that I at least have never seen a more perfect picture of careful cultivation, combined with hard labour, perseverance and fertility of resource than I have seen in many of the halting places in my tour." There is, however, a corresponding

disadvantage, for improvements that are practicable in the case of large farms cannot be undertaken on small farms and the problem of agricultural improvement in their case becomes much more difficult.

The improvements in the methods of cultivation depend largely on the resources of the cultivator which are well-known to be very poor in this country. The Agricultural Board have had to acknowledge that "one reason for the slow progress which could only be hoped for in India, was that the Indian cultivator was not a capitalist. The agriculturist here cannot without any extraneous assistance undertake experiments or introduce improvements requiring an outlay of capital—and it is the duty of Government to render such assistance. The Vice-Chairman of the British Cotton-growing Association in his letter to Lord Curzon says, "We would also suggest for your Lordship's consideration, the possibility of some form of financial assistance to the native cultivators on the security of their crops as in Egypt and the United States, and as in the case with the indigo and tea planters in India, so as to ensure that reasonable interest is charged and that better profits accrued to the farmer than hitherto." The Government of India have adopted the above recommendation and sanctioned a grant for the purpose. The question, however, is why Government did not take any active interest in the matter till they were reminded of their duty by a powerful body in England and why they have not extended a similar policy to other crops also. The motives underlying the request of the Cotton growing Association or of Government's acceding to the same do not matter much so long as the expected result is for the good of the agriculturist and one which may prove advantageous to mill owners also. What ought to be insisted on is that Government having adopted the principle of making grants for improvement in the quality of one staple crop, should not stop there, but must extend similar patronage to other staple crops, although these may not be backed up by equally powerful associations. On the same principle the agriculturist should be assisted with capital for other

agricultural improvements also, e. g., the digging of wells, the purchase of labour-saving appliances and better quality of seed, better manures, &c. Mutual co-operation is another method by which the agriculturist can find cheap capital. The Co-operative Credit Societies Act has been passed for that purpose, and a few societies have already been started in different presidencies but they will take time to grow and to command the capital required for large and permanent agricultural improvements. When they arrive at that stage, they will be in a position to supplement the efforts of the Government, or if they thrive still better Government may withdraw its assistance from the work altogether. But till that stage is reached, it is the duty of Government to render such assistance to the agriculturists.

Dr. Voelcker in his Report says— and Lord Curzon gave expression to a similar sentiment in one of his speeches—"that even were the Government demand for land revenue remitted by one-half, it would not result in the production of that which Indian agriculture requires most of all, *viz.*, more manure to put on the land.....nor can a better system of land tenure directly produce an increased yield of a single bushel per acre, nor can it provide wood to replace cow dung and so set free the latter for the right use upon the land." Those of us who are asking for reductions in assessments or appealing to Government for a reform in the land-tenure know very well that the former will not *produce* manure, nor the latter *directly* produce an increased yield per acre ; but they also know it for certain that reduction in assessment will mean more money in the *raiyat's* pocket, which he may use to procure more manure ; and that a better land-tenure will increase the *raiyat's* interest in his land and will act as an incentive to improve his land so that he may get more out of it than he used to do. It is of course open to the other side to say that the *raiyat* will use the extra money on drink or in marriage and funeral expenses and that under a more secure land-tenure, the land will pass into the hands of the money-lenders. Education is the only remedy to prevent

the agriculturists from misusing such advantages. Unless Government do their duty by the agriculturists, by providing cheap—if not free—primary education for the masses, it does not lie in the mouth of Government officers to cry down the proposed reform on the score of the ignorance of the *raiyat*. The real point at issue is being lost sight of, while the two parties are indulging in mutual recriminations, the one side putting down the peasants' impoverished condition to high assessments and to the periodical revision of survey settlement and the other attributing it to the *raiyat's* crass ignorance or to his being the tool of the *sowcar*. The truth, as is usually the case, lies somewhere between these extremes; and the best course to find that out is to have a typical village inquiry as suggested by the Famine Union. We are familiar with the reasons given by Lord Curzon's Government for declining to grant such an inquiry. They are far from convincing. About the time the reply of Government was published, a few gentlemen in Bombay undertook such an inquiry on their own account. The late Mr. J. N. Tata and a prominent Native State gave the committee all the necessary assistance for holding such an inquiry. After studying the results, it was seen that the inquiry to be useful should be conducted by experts in the line under orders from Government. Very often, the chief sources of information are in Government records and these are not available to non-officials. Then the *sowcar* whose books may have to be examined will produce them only before a committee appointed by Government. Thirdly, the Revenue officers of the Government having more technical knowledge than non-officials will be able to conduct the inquiry much better. Moreover, if the agriculturist tries to give an exaggerated account of his poor condition, these officers will be in a position to verify his statements. Again, if the inquiry were conducted by non-officials alone, Government will not pay much heed to their conclusions. Lastly, there is the question of funds. Government alone can supply the funds for such an inquiry throughout the whole country. It will of course be necessary to have a strong non-official element

on such a committee. The members selected should be gentlemen who have studied the subject and who are fair-minded enough to treat the question as an open one till the inquiry is complete. Such an inquiry if properly conducted will not raise false hopes in the minds of the agriculturists and will bring to light many facts, hardly dreamt of by either the official or the non-official class. If after the past era of commissions, committees and conferences, the Government of India do not feel inclined to appoint another committee, Local Governments can very well undertake such an inquiry on their own account within their own territories; and may introduce necessary reforms in the light of the results of such an inquiry.

The incidence of land revenue on fully assessed area per acre varies in different Provinces.
Land Tenures.

This may largely be due to the difference in soil and other natural conditions, but it is rather strange that the incidence per acre in permanently-settled areas is, as a rule, lower than that in the Raiyatwari tracts. *Prima facie*, there is thus reason to believe that part of the difference in the incidence is due to the increase in the assessments at the periodical revision settlements. It is true that at the revision settlements after the great famine year of 1899-1900, assessments have been lowered in some districts in the Bombay Presidency. But, as a general rule, the tendency of the settlement officers as well as of most of local revenue officers is to make much of the so-called general progress of the districts that are being settled and to raise the assessments on this ground. In the permanently-settled tracts, Government shew their anxiety to look after the interest of the Raiyats as against the Zamindars by passing Tenancy Acts. In the Raiyatwari tracts, where Government is the final judge as to the propriety of proposed increases in assessments, it would naturally be chary of allowing another tribunal, a judicial one for instance, to decide between itself as the supreme landlord and the raiyat. In 1902, Mr. Romesh Chandra Dutt and some other retired Indian Civilians submitted a memorial to the Secretary of

State asking for some degree of uniformity and certainty in the existing land revenue rules. The memorial was referred to the Government of India and Lord Curzon, after consulting the Provincial Governments, issued a resolution on the general land revenue policy of the Government trying to prove that there was no necessity for such reform. If the agitation in favour of the demands of the memorialists is to be continued, it should not be based on theories only. To be effectual it should be based on facts and figures. We, the non-official educated class, owe it to our poor brethren, the agriculturists, to make personal inquiries into their condition, to find out the causes that have led to the same and either to take remedial measures ourselves or to suggest them to Government. Even those of us who are not agriculturists themselves can assist others in forming district agricultural associations, in studying the question from a general standpoint and in guiding their deliberations. Some of us ought to devote a portion of our time in studying the statistics relating to agriculture and land revenue and getting information from the district associations and then representing the *raiya*'s case to Government. Let us show by practical work that we care as much for the "patient, humble, silent millions" whom Lord Curzon charges us with too often forgetting, as for the advancement of the educated classes. Let Government differentiate if they will between the masses and the educated classes. With us, the duty of looking after and promoting the interests of the former must be as sacred as that of guarding and advancing the cause of the latter.

AGRICULTURE IN INDIA.

By DR. HAROLD H. MANN, D.Sc., *Scientific Officer to the Indian Tea Association, Calcutta.*

It is perhaps a truism to say that the prosperity of India is bound up with the success of its agriculture. Such a statement would apply to any country. But more than in almost any country in the world is this true in India. A

larger proportion of the people live on the land and by its cultivation, than is the case in any country comparable with it, except China, and if any disaster happens to agriculture, it not only means a period of stress and strain for the people, but absolute and complete ruin.

In face of this fact, as one travels round the country (and my experience is, I am afraid, limited to Bengal and Assam) two things strike the attention. The first is the extreme industry with which primitive methods of agriculture are carried out, and the second the slight use which has been made of the advances in agricultural knowledge, during the last fifty years, by the cultivators of the country. With regard to the first point, I must say I can never restrain my admiration at the work done by the Indian *raiyat* in Bengal. Without appliances, without capital, without manure, he succeeds in obtaining crops which though small compared with those which could be obtained, are yet marvellous, simply by the untiring industry which makes use of every inch of land, and of every month of the year.

This being the case, I always think that if the same energy could be applied in directions indicated by advances in knowledge elsewhere, the present prosperity of agriculture in Bengal could be increased manyfold. And, as a result, I come to feel that the present greatest need of agriculture in India is that of bringing the knowledge we already have to the notice of the cultivators.

But how? We are all too apt to expect the Government to fill all our public needs in India; but, in this matter, Government can do little. In some provinces they are already doing all they can. They are, however, usually far too much suspected by *raiyats*, as having some ulterior revenue motive, to be able to work directly in the matter, and, though help may be received from Government, yet the bulk of any work in bringing better methods to the knowledge and use of the actual cultivators must be done by others. In fact, it is a case in which I think the enthusiasm of the landed proprietors and others of the people who have

the interests of the country at heart, should lead them to stand out and use their money, their influence, their organizing power, to bring before the eyes of the *raiyats* the advantages to be derived from adopting more up-to-date methods in their work. May I illustrate what I mean ? A friend of mine took up some land in Assam to cultivate for ordinary country produce. Trained as a farmer, he at once adopted methods which appeared strange to the ordinary cultivators of the locality, but which cost little or nothing to do. As an illustration, he changed the method of yoking the oxen to the plough which considerably increased the work they were able to do. At first the surrounding *raiyats* laughed and ridiculed : within a year they had adopted the same method. He has modified the methods of planting rice, enabling the same labour to plant more land, and here again it appears probable that the *raiyats* will follow suit. I could give other illustrations, but this is sufficient for my purpose. No government interference: no government support : practically no capital required beyond that of a cultivator himself, and, gradually, improved methods will be adopted in that district.

The same thing can be done, and more, in nearly every district. In the Central Provinces it is being done. Mr. Sly, the late Director of Agriculture for those provinces, succeeded in rousing the enthusiasm of the local men of influence, and now dotted all over the districts there are a multitude of demonstration plots, certainly subsidised by Government, but under the supervision of local committees, —which are bound gradually to alter the antiquated methods hitherto adopted. Such plots illustrate improved varieties, say of cotton in a cotton district, and so on : they show the effect of a quantity of manure within the means even of a cultivator : they indicate the advantages of improved methods of cultivation, and the ultimate result of their presence cannot remain doubtful. These local committees do more. They arrange on quite a small scale exhibitions of produce, and, the advantage both in crop and quality of the improved methods is manifest.

Is not a system like this possible everywhere? Changes will not be introduced at one swoop, and it will take many years for the cultivators, who are rightly conservative, to become convinced of the worth of the alterations. But improvements will come, and with those improvements the value of the crops of India will be increased twenty, thirty, even forty per cent. The working out of all this, however, *must* fall on the people in each locality, and I can hardly believe that with the matter put plainly before them the zemindars, the rich men, the more educated and better informed men of our rural districts will fail in this matter, so vitally important to the future of the country.

I can only refer to one more point in this connection. It has often been put to me that all improvement is impossible without capital, and capital is precisely what the Indian *raiayats* have not got. In very large measure I own this is true, and for long the difficulty has seemed almost insuperable. Government has recently, realising the difficulty, established a system of agricultural banks, which may in some places solve the problem. But I myself am very much more inclined to rely on co-operation under the guidance of the best local men available. The system of co-operative corn banks, which he calls by the very suggestive name of *Dharma Gola*, founded by Rai Parvati Sankara Chaudhuri, one of the zamindars of Bengal, on his estates, is to me one of the finest moves in this direction of which I have got any knowledge. Its growth being entirely Indian, and not a European abortion, opens to me a future possibility of which one can hardly see the end. This is one means of dealing with the question of lack of capital—there may be many more. Once let us recognise that the knowledge in connection with agriculture at present in hand must somehow be brought to the notice of the *raiayats* and questions of this sort will be settled in each district by its own methods and in its own way.

Knowledge will still increase: methods will still improve: better varieties of our cultivated staples than any yet in existence will be found: new and more profitable crops will

be discovered. A network of experimental stations is springing up all over the land. It remains for the better educated, the influential people of the land, each in his own corner of the country, to bring to the knowledge and impress on the minds of the people the information already available, and to themselves meet, each district in its own way, the difficulties which arise in their application. Then, and then only, shall India, dependent as she always must be primarily on her agriculture, stand forth and take the position which her population and the character of her people warrants, among the nations.

THE PRESENT POSITION OF THE AGRICULTURAL INDUSTRY IN THE UNITED PROVINCES.

By W. H. MORELAND, Esq., I. C. S., *Director of Land Records and Agriculture, United Provinces.*

I have much pleasure in acceding to the flattering request of the Committee under whose auspices this Conference has been organised that I should contribute a brief note dealing in general terms with the position of the agricultural industry in these provinces ; and I regret that circumstances prevent me from attending the Conference in person and that I am thus deprived of the advantages of hearing its proceedings.

The agriculture of the provinces is at present in a state of transition : this central fact is too little realized. Not so very long ago each district, I might almost say each village, produced all or almost all that its inhabitants required ; and it produced very little more. Thus villages in Oudh grew cotton because their inhabitants needed cotton for their clothes ; and villages in Hamirpur grew sugarcane because the people wanted sugar to eat. But the opening up of the country, and the extension of communications both by land and sea, are working a great though gradual change, and each agricultural area is tending more and more to produce those crops which are most suitable to the soil and climate, and therefore most profitable to the grower. Already the

Oudh cultivator grows much less cotton, because he can buy what he wants ; and the Hamirpur cultivator no longer struggles to raise a crop of sugarcane in conditions entirely unsuited to its growth. In either case the land is now put to a better use than was formerly the case, because it is made to bear the crops for which it is suited. There is little doubt that this process of specialization is destined to develop further, and that its progress will be steady though not perhaps rapid ; and the point must be carefully borne in mind in all discussions of the future of the industry.

Now if this process were at work only within the provinces, or only within the whole of India, it would still be important ; but its immediate practical interest lies in the fact that it is in operation all over the world ; every country, every locality almost, is struggling to find out what it can produce most profitably, and having found this out to offer that article in all other markets. Thus you find Austria, Java, Mauritius and other countries sending sugar to India, America sending tobacco and so on ; and if the goods they send are—price for price—of more use to the consumer than those we produce, the consumer will certainly buy them, and our own produce will be left with a restricted market. Those of us who are merely consumers benefit, but those who are producers lose. It is folly to suppose that people will not buy the best article they can for their money : foreign sugar is sold I suppose, in every bazar in Benares and foreign cigarettes are smoked in almost every street : and there are only three courses open to the producer, that is, the cultivator, who find this market diminished. He may acquiesce, and turn to some crop that still pays, though not so well as the last crop formerly paid : he may change his methods so as to compete with the foreign article on equal terms ; or he may grow some new crop in which he finds he has an advantage. The first course means agricultural degradation : the second and the third mean agricultural improvement. Let us take as an illustration the concrete case of sugar, which is produced so largely in this neighbourhood, and let us suppose that the cultivators find

they can no longer make a profit from the crop. They may cease to grow it, and put the land under some other ordinary crop : or they may improve their processes to such an extent that sugar is still profitable : or they may find some new crop that will pay them better. In either of the last two courses there is improvement : in the first course there is not.

Speaking generally then, we may conclude that so long as existing circumstances continue, the agriculture of the provinces must move with the times or in the alternative it must decay. Let me in passing make it clear that we are discussing no exceptional phenomenon. It can hardly be said that agriculture is stationary in any part of the world that is in easy communication with neighbouring countries. Everywhere methods are changing, and while some countries are rapidly improving, others are on the down-grade. It rests with the people of these provinces to decide in which category they shall be classed.

What then is meant by agricultural improvement ? The term is often used somewhat vaguely, and without a very clear appreciation of its significance ; but when used carefully it means simply that a larger net income is obtained from the land. The term raises up many visions : we may think of American implements superseding the country plough ; of steam being pressed into the service of the cultivator ; of wheat displacing gram, or sugarcane displacing wheat : of neatly fenced fields, and of a hundred other ideals. These may or may not be improvements in any particular case ; and the criterion is : do they, or do they not, increase the net income of the cultivator who adopts them ?

Now in considering the possibility of agricultural improvement in this sense, it is essential to bear in mind the economic state of the country, which determines, in the most rigid way, the limitations of effective action. The country is one of small holdings and high interest : the cultivator himself has little or no capital, and the rate of interest is prohibitive. There is no use in trying to convert small holdings into large : such a change would run contrary to

the whole social organisation of the people, and would probably not increase income on the whole ; we must therefore make the best of our small holdings. These remarks may seem to be truisms, but they have a very distinct and practical bearing on the question of agricultural improvement, and it is the main object of this paper to state briefly the results that follow from these premises.

In the first place, it is at present a waste of time to compare these provinces with countries such as the United States or the British colonies, where agricultural science and agricultural practice have made a marked advance in the last few decades. It has been well said that while the Indian cultivator has ample skill but little capital, the farmer in a new country has usually sufficient capital but little skill. The advances that have been made in these new countries are undoubtedly great, but even now it would be rash to assert that the average American or Colonial farmer knows his own business as well as the Jat or the Kurmi. The former's main advantage lies in the fact that he can afford to use the information that is placed at his disposal, simply because he can command the necessary capital.

In the second place, we must conclude that it is of no use to suggest expensive improvements to the cultivator so long as the cost of capital remains prohibitive. This conclusion for the present excludes from the ranks of practical improvements in this country many of the changes that have been so successful elsewhere : to name only a few, all expensive implements, all mechanical power, all artificial manures ; and if we consider carefully the advances in agriculture made, say, in America during the past twenty years, and exclude from them all that are founded on these facilities, we will find that the remainder is not so great as might be thought.

Thirdly, it follows that the provision of cheap capital is very much the most important agricultural improvement that can be suggested, simply because it is the condition precedent of improvements of other kinds. Go among the cultivators themselves, and ask each man what it is that he

wants in order to make a larger income out of his holding. You will find that nearly every answer is a request for capital in some form or other. One man wants a well, but cannot afford to make it : he wants capital. Another man wants more or stronger cattle : he wants the capital to buy them. Another wants to hold his produce till the harvest-glut in the market is over : capital is again what he needs. Another would grow wheat instead of gram if he could afford the seed : another would grow sugarcane if he could pay for the labour needed : another would grow potatoes if he could get the manure. All alike are tied down by the want of capital which compels them to make an inadequate use of their holdings.

Thus quite apart from the advance that is to be hoped for from the applications of agricultural science to this great industry, the fact stands out that capital is the great need ; and so long as the cultivator cannot find money to realise his existing ideal, it is of little use to try and enlarge his ideal by the introduction of new elements that need still more money for their realization. You are aware that the Government of India has decided to increase largely the expenditure on the agricultural department : but this policy can meet with full success only if the supply of capital is organised at the same time. And here let me pause to warn you against looking for large immediate results from the activity of the new department. It is not going to work a sudden revolution in agricultural practice ; its work may be described as mainly a study of existing practices in the light of agricultural science, to see in what details they can be improved, and what adjustments they need to meet the new conditions involved by the increase of communications and the resultant widening of the market. You will see then that the departments will be learning rather than teaching for some years to come but that as time goes on they will be offering more and more improvements for the benefit of the cultivators, some capable of realisation without capital, but the majority requiring a somewhat increased capital for their successful adoption.

Here then is a further need for cheap capital, for much of the labours of the agricultural department will necessarily be wasted if capital is not forthcoming to enable the people to realise their results. So that the supply of cheap capital stands out clearly as the central factor in the problem of agricultural improvement at the present time.

It would be beyond the scope of this brief paper to discuss in detail the methods by which capital can be brought within the cultivator's reach, but a few governing conditions may be briefly stated.

Firstly, the capital required by the individual cultivator is small; but, *secondly*, the aggregate amount required is very great; while, *thirdly*, the supply must be made promptly and on terms that the cultivator can accept. It follows that a very complex organisation is required to control a large capital and distribute it in small sums among a great number of individuals with due regard to the character and competence of each. These conditions make it impossible for the need to be met by banks working on European lines, and to my mind at least—they make it equally impossible to rely on the action of Government agency. In a word the necessary organisation must be built up among the people who are to share its benefits.

As you are aware an attempt is now being made to create the beginnings of such an organisation in India. The economic side of the co-operative movement will no doubt be dealt with fully by other speakers at this Conference: it suffices for my present purpose to point out that either it, or some other equally effective form of organisation, is a necessary preliminary to any considerable improvement in the agriculture of the country; nay more, it is necessary to prevent the progressive degradation of our greatest industry.

IMPROVEMENT OF AGRICULTURE.

By N. G. MUKERJI, Esq. M. A., *Assistant Director of Agriculture, Bengal.*

I assume that I am expected to state from actual experience what improvements in agriculture I can confidently recommend to the raiyats of this country. If I were to advise, for instance, the excavation of wells 21 feet in diameter worked by a 3 H. P. oil-engine and a centrifugal pump, you would at once say, that for most parts of India this is a counsel of perfection that would never be followed by the raiyat, and for gentlemen and capitalists agriculture in the ordinary sense of the term is not likely to pay in a country like India where the climate is such that out-door work in the agricultural season, *i. e.*, from June to November, is not pleasant. The growing of the ordinary crops must remain in the hands of the peasantry, and the peasantry of India is notoriously poor. They cannot afford to invest in manures and implements in use in other countries, and they must be raised by slow degrees by sympathetic bodies like the Conference of the Indian Industrial and Agricultural Exhibition. You expect me therefore to state not what improvements are possible, but what improvements are likely to be taken up readily by the raiyat—improvements that will need little or no capital to achieve.

First with our rice crop as with other crops you will notice some varieties naturally more prolific than others, *i. e.*, given the same soil, the same conditions as to rainfall and cultivation, one seed will give systematically year after year larger crop than others. With rice crop it is generally believed that the produce of the coarse and indigestible varieties is larger. This, though generally correct, is not invariably so. I have, for instance, usually received the largest produce from the Badsabhog and Samudrabali varieties of winter rice. The former variety has been grown for some years past at the Hazaribagh Reformatory School farm also, with remarkable result, and the result obtained at Sibpur has been confirmed in a soil and climate of a totally different

character like those of Hazaribagh. This attracted the notice of some local pleaders and others who grew the Badsabhog variety of paddy with equal satisfaction, that is, they got larger produce from this than from the coarsest local variety. My experience with Samudrabali paddy at Sibpur is being similarly confirmed in other farms, and I can confidently recommend the growing of these paddies to the members of this Conference who would wish to popularise these two varieties among their cultivating raiyats.

These two winter paddies, of course, require sufficient rainfall for their growth. But I discovered a process of growing two other varieties of very superior paddy with very little rainfall. The one is a very fine three-monthly paddy from the Central Provinces, and the other, another three-month paddy, long and thin and sweet-scented but large-grained Peshvari paddy called Swati. Naturally the produce of this Peshvari paddy is very little, though of the C. P. variety the produce is good. But by adopting a special method, you can not only increase the produce to the *aman* standard but make the two paddies most highly drought-resisting. When these paddies are cut in August or September there is plenty of moisture in the ground and the stumps put forth a few new leaves and fresh earheads later on. The aftermath or second cutting of an *aus* crop is not unknown but it is not considered worth gathering and it is eaten up by birds and cattle. But if it is protected and the ear-heads gathered and used next year for seed, a remarkable result is obtained. The crop is more vigorous, more deep-rooted, more prolific, more drought-resisting. This experiment has been carried on for six years at Sibpur and it has been taken up by other farms. When writing to Sibpur, Cuttack, Rampur Boalia, or Hazaribagh Reformatory School, farms, for seeds of Peshvari Swati, or C. P. fine paddy, do not forget to mention that it is seed originally derived from the second cutting that you want. These four varieties of paddy are very superior varieties, and it is a luxury to eat the rice made out of any of them, so the carrying on of the experiment by members of this Conference will not be without personal advantage, though the ultimate

object may be the benefiting of the raiyat. It is a pleasure also to see plots of rice thriving while all others have died for want of rain. This is the special merit of the introduction of this improvement which is sure to appeal to the cultivators more than any other in rice-growing districts.

With regard to cotton I have a similar experience to record. Some cottons are naturally more prolific than others, some naturally more longer stapled than others, some naturally more exempt from insect pests than others. The most prolific, the freest from insects and one which is very long stapled though not quite so much as the Egyptian, is a Sambalpur tree-cotton, some seed of which I got from a solitary tree growing in the compound of a Muhammadan gentleman there. The seed thus collected was sent to Mourbhanj, and Messrs. Shaw Wallace and Co. have reported very highly on the merits of this cotton without knowing the great value of this variety as the most prolific yielder and the best resistant to the attack of insects of all the cottons which are being grown at Mourbhanj. You can get by and by large quantities of this variety of cotton-seed from Mr. N. C. Ghose of Baripada, Mourbhanj State, Orissa, as he is extending the cultivation of this variety of cotton.

There is another most important crop of which I would like to say a few things. The *Mestapat* called *Pattua* in Bihar, *Kaunria* in Orissa, and *Bhindi* in Mahratta country, does not enjoy a very good reputation. But properly treated this crop would prove more remunerative than the jute. This crop is at present grown mixed with five or six other crops such as cotton, maize, juar, arhar, cow-pea, &c. It is also cut when the seed is ripe. Grown by itself with previous long preparation of the soil it attains the height of jute, and cut just when the flowers are coming on the fibre obtained is very strong and silky white. I used to get a rupee per maund more for this fibre than for jute from Messrs. Ahmutty and Co., of Shalimar Rope Works, who prized this fibre very highly. But cut late when the fruits are ripening the fibre is very rough and brittle, and *mestapat* is, therefore, considered in the Calcutta market as a poor fibre. I would ask

you to take to growing the *mestopal* with proper preparation of soil, as a single crop, and cut it in flower before retting it. Plantain fibre is another thing that should be made more of.

Another class of crops which should be more largely grown are the crops which are rich in root-nodules. These fertilise the soil and in a country where the raiyats cannot afford to buy manures, this is the best way of fertilising the soil. Every plot of land should have, if possible, one of these crops once in two years, even as a catch crop. I was glad to find in Mysore in rice, *ragi* and *juar* fields, a line of cow-pea or *barbati* every 6 feet apart. I have supplied Dr. H. H. Mann for the tea-planters of Assam this year with 100 maunds of Dhanicha seed, that a line of Dhanicha may be grown between two rows of tea-bushes. I would recommend the growing of Dhanicha between two lines of cotton as high class cottons are benefited by shade and the root-nodules will supply the manure. The ground-nut is another plant rich in root-nodules and this can be also grown between lines of perennial cotton such as the Sambalpur cotton which I have already referred to. The sunn-hemp and arhar are other crops rich in root-nodules. These nodules are formed in roots of some leguminous and other plants with the agency of Bacteria that harbour on the roots. The quantity is more or less, and those which show the largest quantity should be chosen. The Bacteria are able to convert the free Nitrogen of the air into protoplasmic matter of their body. This cheap source of Nitrogen is very handy for our raiyats who cannot afford to buy such expensive manures as saltpetre, nitrate of soda and sulphate of Ammonia. The recuperative power of arhar, cow-pea and sunn-hemp is recognised by certain raiyats and I found in Pubna and Mymensingh raiyats growing sunn-hemp after harvesting their jute crop in September for the sole purpose of making their lands fitter for jute next year. They say taking a crop of sunn-hemp is equivalent to letting silt accumulate for five years on the soil.

The next improvement I would emphasise is the improvement in the manufacture of *gur*. We have a wasteful process. We do not know the value of keeping down the

acidity of the cane juice and getting thereby the largest outturn of cane-sugar and the smallest proportion of molasses. The method of clarifying the juice with lime on slow fire, and afterwards boiling the juice gives very fine result, only about 15 per cent. of molasses in place of 40 per cent. which is perhaps our Indian average.

Reverting to the question of manure I have two recommendations to make besides the growing of crops rich in root-nodules. The first is, let raiyats feed their animals well with purchased oil-cake or cotton seed and let all the dung, urine and litter formed by them go back to their field. Spending Rs. 5 a month per pair of cattle in this way, they will keep their bullocks in condition while enriching their land. The cow-shed should be changed every six months, *i.e.*, strong wooden posts should be planted, on them lighter pieces of wood put as roofing and straw of cereals and pulses put on the top of this frame work while the cattle can be kept underneath. This is the custom followed in many parts of the country. If the weather is inclement some side protection may be devised. By changing the cow-shed in this way from place to place, different parts of the field get manured. At present all the urine sinks in the immediate neighbourhood of the cow-house and the crops get no advantage of this valuable manure. The system also is more unhealthy for men and cattle. There would be less cattle plague if the position of the cattle-shed is changed like this. Over and above this the purchase of oil-cake for feeding the cattle would result in further benefit to cattle and land.

The second recommendation is, Do not let outsiders collect and take away bones from your Zemindaries. This denudation of the soil is most injurious. The bones are collected, ground in mills near Calcutta and exported for manure to England, France, Mauritius and other countries where the high value of this manure is understood. If you object to using this manure, bury the carcases of your animals that the collectors may discover no bones for collection. Hide them away from sight. Let every village have its *Dom* and let two or three villages combine to have a burial ground for animals

after they have been skinned by the *Doms*. The skin has not the same manurial value as the bones, flesh and blood ; and these left on the surface outside villages produce in time epidemics. The hiding away of bones will thus be a sanitary improvement also and if valuable fruit trees, and any trees suitable for fodder and fuel, such as the mulberry tree, are grown, the fertilising effect of the carcases of animals will spread in the adjoining fields by means of shed leaves and fruits and leaves consumed by animals. The utility of growing trees is manifold, and the fertilising effect of the presence of trees in the neighbourhood of fields cannot be ignored. The denudation of the country of trees is affecting the quantity and distribution of rainfall most injuriously. In any case, do not allow bones to be picked away from the village *golgothas* which are the zemindars' *khamar*.

With regard to implements I can advise for the present only the general introduction of drill and the bullock hoes which are already in use in many parts of Southern India. Keeping the soil free and open while the plants are growing is equivalent to manuring a crop.

There are various improvements in connection with the dealing of insect pest, in connection with irrigation, with introduction of new crops, treated of in the books* I have published, but I have brought to your notice a few of the most prominent ones which can be easily availed of by the people.

CO-OPERATIVE CREDIT FOR INDIAN AGRICULTURE.

By J. HOPE-SIMPSON, Esq., I.C.S., *Registrar of Co-operative Credit Societies, United Provinces.*

It was with peculiar pleasure that I accepted the invitation to read a paper on my special subject at this session of the Industrial Conference. For the material progress

*Handbook of Indian Agriculture, published by Thacker, Spink & Co., and Saral Krishibijan in Bengali and Uriya, published by the Indian Gardening Association.

and redemption of India lies to my mind primarily in industry, secondarily only in politics, and so much can be effected by the former that it has always seemed to me a matter of great regret that hitherto the progressive party has sacrificed its best endeavours and energy solely at the altar of the latter. Progress in politics is bound to follow on the heels of material progress. It can never come as an antecedent. To the man who has to struggle year in year out in order to gain daily bread for his family and for himself, it matters little under what form of Government he lives. All he desires is peace, and liberty to pursue his accustomed task. It is when the bare necessities have given place to some superfluous luxury, and when the acquisition of luxury has again left him some leisure, that the subject is at liberty and in a position to criticize the form and detail of Government, and to argue as to the steps to be taken for improvement. And reform cannot come from a class. It must come in accordance with the desire of the mass of the people. Until they are in a position to understand and demand reform, the work of the progressive class is as the voice of one crying in the wilderness. The inception of this annual Industrial Conference is a proof that these views are gaining acceptance. If they can be translated into practice, the impetus which will be given to Indian industry, and the improvement which will be effected in Indian agriculture cannot fail to be momentous. If we believe that the salvation of India lies in the mill and in the farm rather than in the forum and the lecture-hall, it is incumbent upon each one of us to do what in him lies to improve the conditions and methods of agriculture and handicraft. To explain the method in which each man can assist is my object this afternoon.

It is of co-operation as applied to credit that I have been asked to speak to you. And in order to a right understanding on the subject, it is necessary that we should begin by an enquiry as to what credit actually is, and as to the part which it is called upon to fill in the economic organization of this country. Credit has been defined as a

man's power of borrowing, that is, the extent to which he can command financial accommodation. It may be interpreted as the measure of confidence which the capitalist reposes in the borrower's honesty, and in his ability to fulfill his obligations. Credit cannot be dependent upon honesty alone, for honesty is frequently the companion of hopeless incapacity. Nor can it be dependent solely upon ability to repay, for that ability is sometimes wedded to dishonesty of the most flagrant type.

In the agricultural classes we find both honesty and capacity in a high degree of development. They should therefore be in a position to command credit at cheap rates. In fact, however, we find the contrary to be the case. Agricultural credit is notoriously expensive and notoriously insufficient for the needs of the class. The reasons for this state of affairs are somewhat obscure, and it is not the province of this paper to discuss them in detail. There is no doubt that they lie in part in the poverty of the people, in the fact that the individual amounts demanded are small, in the existence of the hereditary money-lending class, in the conservative traditions of the people and in their illiteracy. Something must also be placed to the credit of the precariousness of the seasons,—one rainless year being frequently responsible for the loss of enormous amounts of capital laid out by the money-lender at interest. Something must also be laid at the door of the troublous times through which the country has passed, in the days before the introduction of the Pax Britannica,—days still in the recollection of living men in large tracts of these Provinces. Since civil disturbance ceased, the rate of interest for agricultural credit has maintained an unequal fight with increased prosperity and consequent abundance of money, but artificial rates are still the rule rather than the exception, and there remains an ample and fruitful field for co-operative effort towards cheapness of financial accommodation for agricultural operations.

The part which credit is called upon to fill in the economic organisation of agricultural industry is, in this country, extremely large. Holdings are usually small, and the

agriculturist has, as a rule, but a small amount of capital. He obtains advances for every conceivable description of expenditure. The poorer cultivator requires them for seed and for cattle, for manure for his fields and for payment of his labourers, for the payment of his rent, for food for himself and his family between harvests. There is scarcely any kind of expenditure to meet which, at one time or another, the smaller cultivator does not borrow. It is then obvious that the provision of cheap credit is a matter of enormous importance to the agricultural community. Not only would cheap credit result in large savings on existing transactions,—it would permit of an extension of dealings on credit, of which the effect would be still more marked in the general prosperity of the country. It would enable the cultivator to hold his crop in order to ensure a better price than that obtaining at harvest, or to combine for the purpose of its advantageous distribution. It would enable him to purchase implements which are at present outside his financial range, but the possession of which would more than repay the outlay. It would enable him to use paying fertilizers which are at present out of his reach.

It is a matter of notoriety that co-operation increases the credit of the individual co-operator. That this must be so is, on consideration, obvious. Where a group of individuals combine to raise a loan, and where their liability is joint and several and their responsibility unlimited, the security for the loan is better than would be the security for a proportionate loan to any one of the members individually. In the case of a loan to an individual, however honest and capable that individual may be, there is an unavoidable possibility of accidental loss. The borrower may suddenly die, he may be overcome by calamity which it is entirely beyond his power to avert or overcome, his cattle may be stricken by murrain or his fields by blight. In the case of a co-operative loan, the possibility of loss to the creditor as a consequence of such untoward accidents is reduced to a minimum. If one of the members should die, or should fail, recovery can be made from the rest of the body, and it is in the very highest

degree improbable that all of them or even the majority of them, will be overtaken by unforeseen calamity.

It is because these facts are realised that the joint-stock banks in European countries habitually advance money to co-operative societies at rates much below those charged to individual borrowers even of good standing. In Ireland, where the members of such societies are usually poor and ignorant, and frequently illiterate, societies are permitted to draw against a cash credit at 4½ per cent. per annum. The security offered is purely personal,—the joint and several responsibility of the society's members. It is no whit better than the security which could be offered by similar societies in this country. The only reason why the latter are, at the present moment, unable to borrow at reasonable rates is ignorance on the part of the capitalist class of the principles of co-operation, and of the stability of co-operative societies.

The primary object of a co-operative credit society is the creation of credit for those of its members who have been hitherto unable to obtain credit at all, and the extension of credit for those who are able to borrow, but in insufficient amounts or at exorbitant rates. It is a link between the class which desires safe investment and that which is in need of financial accommodation, but of which the members are such small men that they are forced to deal with the local usurer. The reason for this compulsion is the fact that it would not pay the capitalist to lend the small amounts which the small man requires.

Apart from its primary object such a society has secondary results which are scarcely less important. It is a great educative factor in business methods. It is a premium on honesty. It is a discouragement to wasteful expenditure. It is also in one way a most important moral factor, for the immoral, the dishonest, the drunkard and the cheat are, owing to the provisions by which new members are elected, absolutely certain to be excluded from the society.

Societies of this general type can be organized to serve many ends. Village and town banks provide financial accommodation for their members. They are in many ways

the most simple to work, and their results are usually obvious and tangible. Co-operative credit can, however, also be applied to the creation of seed-stores, to manufacture, to collection and distribution of produce, to insurance of life or of cattle, to provision for sickness or old age. It can be made to provide the necessities of wedding and funeral ceremonies, and in this country could thereby serve a most useful purpose in reduction of the expenditure upon them. There are a thousand directions in which co-operative credit can prove its usefulness, once the system of co-operation has been grasped in any one of its forms.

The history and results of co-operative credit in other lands are at once an important educative influence, and an inspiration to those whose duty or whose pleasure connects them with the movement in India. It is on record that the present position of Denmark, as with one exception the country with the richest population in Europe, is entirely due to agricultural co-operation. A hundred years ago that country was the poorest in the European comity. It is notorious that the prosperity of rural Germany is in large part, if not mainly, the effective result of societies of the Schultz Delitsch, Raiffeisen, Haas, or other types. In Italy an economic revolution has been effected by Cavaliere Luzzatti, Dr. Wollemborg, and their disciples. In France, state interference has undoubtedly checked the progress of the movement, but hopes for the future are bright and success in the southern provinces has been attained. In Ireland the last few years have witnessed a most remarkable and important extension of co-operative effort in the poorest parts of the country. Irish butter, produced by dairies of the co-operative type, promises once again to reach its pinnacle of excellence, and farm produce from the distressful country, to compete on favourable terms with that from the continent. In England itself the movement has hitherto been generally confined to friendly societies, building societies, and distribution. Agriculture has been too conservative to avail itself of a remedy which has been found effective elsewhere. There are however signs that the days of this conservatism

are numbered, and that those principles which created the society of the Rochdale Pioneers, and converted that society into the Wholesale Society, with assets and outturn each running into millions sterling, can no longer be neglected by the agricultural classes.

It would be beyond the scope of this paper to describe at greater length the success which has attended the movement elsewhere. To those interested I would recommend for perusal Pratt's "Organization of Agriculture,"—(which can be obtained from Messrs. Thacker, Spink and Co., and doubtless elsewhere also, for a modest five rupees),—Wolff's "People's Banks," and other publications by this writer, portions of Mr. Dupernex's book, "People's Banks for Northern India," and above all Sir Frederick Nicholson's invaluable report, the first volume of which was published in 1895, on the possibility of establishing co-operative credit societies in this country.

The idea of co-operation is to be found in India in various forms. It exists in very pronounced degree in the caste and in the village community. The same may be said of the idea of joint and several responsibility, which over enormous areas is a basic principle of land-revenue liability. It is strange, therefore, that the principle of co-operation for credit should be so conspicuously absent. Not that the indigenous Co-operative Credit Society is unknown. In Madras one finds the Nidhi, which is a friendly society of a modified type, and which, unfortunately, seems peculiarly liable to offer temptations for fraudulent manipulation of its funds. In a recent report on the working of Act X of 1904, the Registrar of Co-operative Credit Societies for the Panjab has described a most remarkable indigenous Co-operative Society which had for its original object the prevention of diluvion in an unstable tract of a submontane village. The co-sharers for this object pooled the *shamilat* income of the village. As funds permitted, mortgages on shares in the village were redeemed, and mortgagees in possession ousted. The present state of affairs is most satisfactory. The mortgagors have been in many cases entirely, and in others

partly, reinstated in possession of their shares, the precarious tract has been rendered safe from further inroads of the hill stream which threatened it, and trees have been planted which will, in a few years, represent property worth three lakhs of rupees. The Society's life was originally fixed at 20 years and at the end of that term its profits will be available for distribution. We may be permitted to hope that the Registrar will be able to prevent such an early dissolution. The Society is invaluable as an object lesson, and if only as an object lesson, should be preserved. Still more important is its preservation as a centre from which to propagate new societies, which will provide for other villages benefits of a like description.

Official connection with the movement in this country commenced with Sir Frederick Nicholson's report. It was further stimulated by the publication of Mr. Dupernex's book. Sir Antony MacDonnell took up the subject with characteristic energy, and in these Provinces some 200 Societies of the Raiffeisen type were founded in 1901. Simla continues to interest itself in the question and last year saw the passing of Act X of 1904, the Co-operative Credit Societies Act, and the appointment of Registrars. The duties of these officers are of the widest description. Had they been confined to the registration of societies, it is probable that gratuitous registration would have proved an expensive matter for Government. As it is, the Registrar is a peripatetic individual, who might very accurately be described as a *khana-badosh*, and entered in the list of wandering tribes. His duties include propaganda, and it is as propagandist that I appear before you this afternoon. It is the expressed intention of Government that the co-operative movement shall have every chance of success that Government can afford, and the expenses which Government has already incurred, and is further prepared to incur, together with the privileges which it has accorded to societies registered under the Act, are an indication of the measure of importance which is attached to a full and free trial in this country of the principles of co-operation. This is as much as any Government

can or should do. The action which remains necessary for success must come from the people. And you, gentlemen, are of the people from whom that action must proceed.

We may now assume that being convinced of the benefits which have attended co-operation elsewhere, being convinced also of the enormous advantages which must attend its extension in this country, some one or more of you desire to assist that extension by the exercise of your personal influence and persuasive powers. It is advantageous that we should at the outset consider the method to be followed in order to found a society, and the difficulties which must be faced and overcome. Many of you are, doubtless, in a position to found societies by force of order, in virtue of your status as land-owners or men of influence in your immediate neighbourhood. May I take the liberty of saying that societies founded as the result of an order, or of pressure from above, are bound to fail? Our experience of the last few years has proved this conclusively. The only satisfactory basis for the foundation of a society is conviction. And conviction can only be ensured by knowledge, and knowledge by teaching. So the first step is instruction. Choose some village where the agricultural community is comparatively free from feuds, and where, owing to its social constitution, or for some other reason, the members of the community would probably be willing to combine. Then go to the village and preach co-operation and combination. Listen to the arguments brought forward and answer them as best you can. Let the people go away and consider the question and then return and adduce any further objections they may have evolved. Meet those objections again, taking them all seriously, however frivolous, or to your mind, ridiculous they may appear. It is a long and wearing process, tiring to the teacher, and trying, in the extreme, to the temper. But maintain the patience of Job. It may take a day, it may take three or four, or even longer, it may be entirely unsuccessful; but the probability is that, given conviction on the part of the propagandist, the result will be, if not conviction, at least a new-born hope on the part of the taught. Then when

they are willing to make their attempt, the villagers present should be asked to nominate three or four of their number, in whom they have confidence as leaders and honest men, to further discuss the subject and its details. When this has been done, progress is rapid. The next step necessary is to prepare a list of fifteen or twenty agriculturists of whose rectitude and honesty these leaders have no doubt. This done, those fifteen or twenty are called together, and the list carefully revised by them, any one, to the inclusion of whose name there seems the slightest objection, being ruthlessly removed from the list. When this has been done, you have in the small remaining company the nucleus of your co-operative society. But your difficulties have only begun. For, in order that the society may be a success, it is necessary, first, that it should be managed by the representatives of the members, and their business ability is frequently extremely minute ; second, that the accounts should be kept, and, in many cases, where faith in co-operative credit is strong, it is accompanied by illiteracy ; and third that, whatever the form of the society, sufficient funds should be raised at a comparatively moderate rate, to meet the requirements of the members for the first few years. The local *mahajan* being unconvincing of the stability of the society and having a keen regard for his own usurious rates of interest, is unlikely to come to its assistance.

The first two of these difficulties can be met by careful choice of the locality in which the experiment is initiated. It is at least as easy to induce the literate to co-operate, as the illiterate, and those villages are numerous in which a cultivator with some slight knowledge of letters is to be found. In one of these the trial should be made. Finance may be found more troublesome. It must be borne in mind that Government is willing to lend free of interest for three years and thereafter at 4 per cent., a sum equal to that which the members themselves subscribe. The promise of this advance usually results in a certain sum being raised within the society. Say, the requirements of the members are Rs. 500 and that Rs. 100 has been raised by deposits.

Government lends a further Rs. 100. Rs. 300 is then the sum to obtain which the society must approach the capitalist. It will probably be found possible to obtain this sum at a reasonable rate of interest from some interested capitalist or friendly land-holder.

The difference between the amount which the society pays for its accommodation, and that which it receives from its members on the amounts lent to them, represents the profit of the society. In order to attract deposits, the society must allow a high rate of interest, say, six and a quarter per cent., or one anna in the rupee per annum on fixed deposits for a year. It will also be found that money cannot be borrowed on behalf of the society at a lower rate than six per cent.; in many cases an even higher rate must be paid to obtain the necessary capital. In order that the reserve fund may grow rapidly, it will consequently be necessary at the commencement to charge a rate of interest on loans to members, which, although a large reduction on the usurious rates of the professional money-lender, is at the same time considerable. In most cases in these provinces the rate charged by societies is $12\frac{1}{2}$ per cent. per annum,—or two pies in the rupee per mensem. In one most successful institution it is three pies in the rupee per mensem.

Once the village society has made a fair start, further progress is simple. Experience proves that the example of one successful village-bank is more powerful than unlimited precept. Each successful bank becomes the nucleus of a large number of similar institutions in the neighbourhood. Extension, however, brings its own particular difficulties. Each new bank, or other society means a repetition of the difficulty as to accounts and finance. Each institution means an addition to the duties of supervision thrown on the Department of the Registrar.

An attempt to meet these difficulties and to provide an automatic means of extension has led to the adoption of the Central Bank system in certain districts of these Provinces. The system promises to be a success, and as it is simple in working and easy of supervision, a short description of the

method will not be out of place. A Central Bank stands to the constituent village societies in a position almost exactly analogous to that which the village society occupies towards its members. Its functions are to raise capital on behalf of the societies, to grant them cash credits, to receive deposits made by their members, and to keep all accounts. By its means the difficulty of local account-keeping is overcome, and as it deals in thousands and tens of thousands of rupees, while the village society deals in hundreds only, it is in an obviously better position to approach the capitalist with hope of success. One of the chief difficulties in obtaining money from a joint-stock bank in order to finance village societies lies in the smallness of the individual loans required. They are so comparatively minute that it does not pay a joint-stock bank to undertake the business.

The membership of a Central Bank consists entirely of representatives of village societies. Where the number of such societies is small, the members of their *Panchayats*, ex-officio, form the Central Society. Where their number is large, it is sufficient that the *Sarpanches*, or heads of *Panchayats*, should be the ex-officio representatives, on the membership rolls of the Central Bank. By the by-laws of the village societies these representatives are empowered to pledge the credit of the societies they represent. The responsibility of the members of the village societies is thus twofold. Primarily, each member of a village society is jointly and severally responsible with each other member for all loans advanced by the Central Bank to his society. Secondarily, each member is jointly and severally responsible with the body of members of all constituent village societies, for the whole of the loans raised by the Central Bank.

One very important advantage attaching to this system is that all profits are acquired by the Central Bank. This fact has two results: first, the reserve fund becomes very rapidly a valuable asset of security; second, it is possible to pay for professional account-keeping.

It is impossible in the limits of this paper to describe in detail the interior economy and management of a Central

Bank and village societies. Leaflets on the subject and model by-laws have been prepared, and are available for perusal by any one interested in the subject. They are distributed free of charge to any who care to apply to my office in Lucknow.

In addition to Banks there are many other forms of co-operative credit which are applicable to agriculture. How to obtain good and reliable seed for his fields at a reasonable price is one of the continually recurring problems of the cultivator. It can be solved by the co-operative seed society, in which the members raise capital as for a bank, invest that capital in seed, distribute the seed among themselves on *sawai*, and from the profits pay the interest and repay the borrowed capital by degrees, being left with a stock of good seed sufficient for the requirements of the society. Surplus stock can be sold, new seed bought, and deterioration in this manner avoided.

In Bengal there are *dharma-golas* for the maintenance of a stock of grain in the village. These are a most useful form of society, and to them the co-operative principle might well be applied. The profits which might be made by societies of this type are enormous, provided management be careful and honest. Recent enquiries into the possibility of founding such a society in the Gorakhpur district showed that a profit of over 14 per cent. could be ensured by storing grain at harvest and selling it a month later when prices again fall.

Land mortgage societies of the Panjab type or similar societies of types fitted to local conditions might be made to serve a very useful purpose in preventing property passing from the hands of the hereditary small shareholders into those of the professional money-lending class. One such society has recently been founded in this Division, having for its object the redemption of usufructuary mortgages on fixed rate holdings. I trust that it is but the pioneer, and that it may be followed by many more.

For co-operative societies for the provision of capital to cultivators of sugarcane to enable them to dispense with advances from the sugar-boiler, and sell their produce in the open market, there is a wide opening. A further development

is possible in providing the necessary machinery for boiling and refining, so that the cultivator might himself place his *khand* upon the market, and so obtain the profit which at present goes to the middleman. These are a few of the possible directions in which co-operation may assist agriculture. It is necessary to remember one great fact. The form that co-operation assumes is a very minor matter, as long as true co-operation be there. Once the idea and the principles of co-operation have been grasped, they will find for themselves new and appropriate channels.

Before closing this somewhat lengthy paper, I should like to draw attention to the possibilities of co-operation apart from agriculture. Its power is unlimited in every direction in which cheap credit is desired. The urban bank for small traders and officials, the provident fund for employes in offices and houses of business, the association of small producers with the object of placing their products on the market—all these are not only possible but easy. There is in this city at the present moment a most remarkable movement among the weavers, which has eventuated in the Benares Co-operative Silk-weaving Association. It is of a true *Swadeshi* and self-help type, and I trust that many among you may show your good-will and desire to assist in a truly practical manner by making purchases, and placing orders. The scope of the co-operative movement is, as I have said, unlimited. What it requires most of all is intelligent propaganda and sympathetic supervision. In both of these directions the non-official is of more value than the official, for he is looked upon without suspicion by the people to whom he speaks. So I say to one and all—study co-operation until you thoroughly understand the principles on which it is based. Then go forward and preach, for co-operation once rightly understood, makes each man its missionary.

NOTE ON CO-OPERATIVE CREDIT FOR AGRICULTURE.

BY SIR FREDERICK LELY, K.C.I.E., *Late Chief Commissioner
of the Central Provinces.*

The position I take to be this. The cultivators as a body are dependent on borrowed money. They demand it, as the same class does in every part of the world, for their field operations, and in this country for the marriage of their daughters, for the obsequies of their relations and in latter days for the hire of labour and for buying comforts which their forefathers did without. Hence outside capital being necessary, one of the first of economic questions is where it should come from and under what conditions. There are many who urge that Government should supply it, and Government itself by offering *Takavi* admits its duty as a landlord to make advances for definite improvements and necessities. Many go further than that and ask in effect that it should finance on easy terms the whole agricultural community. Dr. Murdoch who is entitled to a respectful hearing on everything which concerns the welfare of India, estimates the amount required at 30 crores which he thinks should be distributed from the public treasury in small loans by an organized department. We already have enough departments. They mean too often unscrupulous subordinates under imperfect control, and though they are sometimes necessary, I cannot talk with so light a heart as Dr. Murdoch of introducing a new swarm to buzz about the private concerns of every cultivator, and to have the handling of 30 crores of rupees. The result would be great gain both in numbers and force to that bane of all rule in the East—petty officialdom. I say nothing of that fatal tendency to relegate every economical activity to Government which should be strenuously resisted by every friend of the people. If the State is to find the ryot in cash for buying seed and wedding presents for his daughter, it is not clear where it should stop until it has engulfed all those self-reliant qualities which go to make a nation of men.

A simple reason why Government should not intrude its capital on the market is that a sufficient supply already exists without it. Speaking generally the village Bunnia draws upon his bigger brother in the town. Every town is in fact a reservoir of capital which flows into the villages during the hot weather and rains and flows back again when the crops are reaped. The channel is the Sowkar. I have no wish to rail at him. He is no worse, if no better, than the average man would be in his place ; but he has inherited bad traditions, and hence the local capital instead of dropping as the gentle rain of heaven, upon the villager's land, comes to him diminished by usury and dishonest tricks and fraught too often with his ultimate ruin. It is not the duty of Government to supply capital when it exists already, or to oust the private investor, but it may be its duty so to regulate the flow that the borrower may not be unjustly used and may not be tempted to incur more debt than he can pay out of his income. It has been suggested as one way of doing this, to set up a new type of Sowkar. Sir William Wedderburn and more recently my friend, Mr. Lalubhai Samaldas and others, propose to establish a Joint Stock Company—a many-headed Sowkar—which begins by demanding concessions of a startling character. At the outset the ryot's existing debts are to be examined and compounded by a Government Commission. A substantial loan of public money at a low rate of interest is to be given, besides exemption from stamp duty, preference over all other private debtors, recovery of instalments by agency of Government officers, and audit by a Government staff. In return for all this we are to content ourselves with an undertaking by the Company not to charge interest above a certain limit and an amiable assurance that it will not sell up the ryot's land unless it is obliged to do so. To begin with, it is clear that these enormous concessions could not fairly be granted to one set of men only. They should be equally available to the village Sowkar and to other companies, provided they will make the same fair promises. Experience has taught there is nothing

more easy to impose and more easy to evade than a restriction of the rate of interest. Even if the Company honestly tries to keep within its prescribed rate, it is doubtful if it will be able to afford to do so. The village Sowkar carries on his business himself and knows the circumstances of every one he deals with. He has no expenses and makes few mistakes. The Company will have to work through agents who will often mislead it through ignorance if not through dishonesty. Hence bad debts which will have to be recouped by raising the interest or they will soon land the company in bankruptcy. It is explained that many of the prospective share-holders are themselves money-lenders, but it is not clear how 20 men leagued together are likely to treat the ryot differently from what each of them would if alone. That Government should appoint a Commission to scrutinize the domestic accounts of millions of landholders including every entry of a petty loan, and haggle with creditors for an abatement; that it should pay the money down instead of leaving the debtor to fight his own battle; that it should collect the share-holder's profits for them—all this could do nothing but harm to the national character. It is not worth while to emasculate a people, even to pay their debts.

Underlying all these schemes is a misconception of the real need. It is not true that, in the words of Sir W. Wedderburn, "when capital once reaches the ryot he knows well what to do with it". It is not true that it will of itself induce him to bring on his land water and manure and make it overflow with spices and tobacco, with tea and cotton and jute. It will for the most part only entice him deeper into personal expenditure unless an automatic check on borrowing is provided, such as existed in the days before the land was made a saleable asset, or such as is involved in co-operation. The Bill recently passed into law by the Government of India accepts the experience of Europe, and would unite the functions of borrowing and lending in the people themselves, inducing them to use their credit for getting money cheaply and their joint knowledge

and influence for distributing it judiciously. The thing will be hard but it is worth trying, and there is much to encourage hope. The instinct of the Indian is to associate and combine—socially into caste, industrially into the Trade Guild, or Mahajan, politically into the village or Sabha. It is a land of tribes and classes and castes, all bearing within them the spirit of co-operation. The ancient village community to which many look back wistfully is impossible now. The modern individual asserts himself and will not be content to share his right with others or submit his claims to a circle of elderly neighbours who may be—probably will be—swayed by faction or personal spite. Those who most admire the past would be the first to protest if it were revived in detail, if e.g. the whole of a modern village were held liable to make good stolen property which had been traced to within its bounds. Still for all that the germ of self-help is to be found in the Village rather than in the artificial Local Board. As the old English guilds have been succeeded by the modern Friendly Societies, so from the village commune may arise a brotherhood which shall harmonize the modern sense of individual right with the need of mutual help. We are told how in the past the village lasted where nothing else lasted. It held together to defend itself against the marauder, against the evild-oer within the gates, against the rapacity of the Central Government. Why should not the descendants of the same men close their ranks against the usurer? No legislation or Government action alone will do it, though it may enable and assist. Having got the law we want the men—not necessarily many men—for if one single pioneer can sit down with the better sort of villagers and work out a scheme with intelligence and patience—if he can get one village through the fence of conservatism and apathy, a whole province will follow. That at any rate was the experience of a few years ago in Gujerat where 300 provident societies—unsound though they were—were founded in two adjacent districts within a few months. The law itself embodies no definite scheme to be successful or unsuccessful. It contains no coercions, no pains, or penalties. It simply

throws the arena open to the people and assures them of supervision against vagaries, honest and dishonest, and of kindly help if they will band themselves together in the spirit of their fathers and defend themselves.

NOTE ON CO-OPERATIVE CREDIT SOCIETIES IN THE MADRAS PRESIDENCY.

By P. RAJAGOPALACHARI, Esq., C.S., *Registrar of Co-operative Credit Societies, Madras.*

1. *Preliminary.*—The Registrar appointed by the local Government to administer India Act X of 1904 assumed charge of his duties in July, 1904. Fifteen rural and five urban societies have been registered till now, and they are in eight districts.

2. *Policy pursued.*—The policy pursued has been to allow the utmost freedom to organisers in each case to start their society on such lines as appeared to them suitable, provided that the rules framed did not contravene the Act in any essential matter. This being the policy, no selection of districts for operations was made nor were any rules issued by the local Government under the Act. It was apprehended that the issue of rules at an early stage might tend to stereotype societies in one or two forms and prevent that healthy development so essential to the success of the movement. In the earlier banks there was a pronounced tendency on the part of the organisers to frame their constitution on the lines of the Nidhis in the Madras Presidency, for a description of which please see Sir Frederick Nicholson's book on banks. The Madras Nidhis came into existence nearly half a century ago, and notwithstanding many failures and notwithstanding the fact that they have been hampered by an unduly rigid constitution, it is admitted by everybody competent to pronounce an opinion on the subject that they have done good work in familiarising the people to co-operative action in matters of credit. Naturally,

therefore, when operations under India Act X of 1904 commenced, the organisers of the first societies looked to the Nidhi model for guidance in preference to the models of the European societies which were held up to them for imitation. After anxious consideration, it was resolved to allow organisers to have their own way—provided that they kept within the Act—trusting to time and to experience to familiarise the people with the models of the Raiffeisen societies of Europe and to start societies on those lines. The Madras Government in some cases even went further and registered certain societies under the special power vested in them by section 29 of the Act.

3. *Results of policy.*—The above policy has justified itself by the results achieved. Not only have we succeeded in starting several purely Raiffeisen banks within the last six months, but several of the earlier banks—which at the outset were little more than joint stock banks—have gone on amending their constitution, till now there is very little difference between them and purely Raiffeisen societies. On the whole, two forms of banks are now developing. One set follow mainly the lines of Nidhis. The other set are wholly or almost wholly on Raiffeisen lines. The urban societies of Conjeeveram and Tanjore and the rural society of Kaveripak are close copies of the Nidhi model. Another urban society—namely that at Namakkal—and a few of the rural societies started at the outset, stand midway between joint stock banks and Raiffeisen societies, but the rural societies have been gradually amending themselves and approximating to Raiffeisen ideals. All the other rural societies have been from the outset mostly on Raiffeisen lines. We have an urban society at Madras, called the *Triplicane Urban Society*, which has a stores department attached to it as well as a credit branch, and which Government have registered on the ground that a society, the members of which are mostly men of limited means, and which aims at cheapening to them the cost of the necessities of life in addition to providing facilities for credit, complies substantially with the requirements of the law. It may be interesting to know that

the organisers of the Triplicane society say that they had in view the society at Poligny in France, described in Sir Frederick Nicholson's book.

4. *Provision of Funds.*—The question of providing funds gave some trouble at the outset, but of late the societies have not had much difficulty in getting all the money they required. Under the Notification of the Government of India, a rural society can be granted a loan from provincial funds equivalent to the share capital and deposits put in by its members—provided, however, that such a loan shall not in any case exceed Rs. 2,000. In pursuance of the above order, a sum of Rs. 6,100 has been till now disbursed to four rural societies. Moreover, out of the sum of Rs. 5,000 placed at the disposal of the Madras Government by the Hon. Mr. D. M. Hamilton, a sum of Rs. 1,400 is about to be disbursed to four other rural societies. It is estimated that the aggregate working capital of all the societies (excluding the Central Bank) now in the Madras Presidency made up of share subscriptions *paid*, deposits received and moneys borrowed otherwise than by way of deposits—exceeds half a lakh of rupees. This will show how small a part the loans given by Government play in the financing of these banks. In view to the fact that a large increase in societies is anticipated in the near future and that we *may* then be confronted with difficulty in financing them, a Central Bank has been started in Madras with a capital of Rs. 25,000 to be amplified later on as societies increase whose sole object is to lend funds to co-operative credit societies in the mofussil.

5. *Loans.*—Under India Act X of 1904, loans are admissible only to members. This provision is of course rigorously enforced as it is a vital one. In regulating the purposes for which loans are granted, however, there is considerable divergence of practice among societies. At the outset, not a single society would agree to concern itself in any way with the use made of the loans granted by it. But after a time, several rural societies laid down rules to the effect that no loan should be granted except for productive purposes. In the case of urban societies, it has been

found that most of the loans are taken to pay off prior debts. In the case of rural societies, loans are chiefly taken for cultivation expenses, for the purchase of cattle and for the payment of the kist due to the Sirkar or the rent due to the zamindar.

6. *Interest.*—The interest charged by the societies on the loans granted by them to their members varies from $7\frac{1}{2}$ to 10 per cent. per annum. The usual rate is $9\frac{1}{2}$ per cent. per annum, i. e., $1\frac{1}{2}$ pies per rupee per mensem. It has not been considered expedient to make loans too cheap at the outset. As the rate which the Madras ryot pays for the moneys borrowed by him is seldom less than 12 per cent. per annum and as the average rate may be taken to be 18 per cent., it is obvious that 9 per cent. per annum is a substantial instalment of relief. For moneys borrowed by the societies (either by way of deposits or otherwise) the interest paid ranges from 6 to 9 per cent. per annum. The usual rate is $7\frac{1}{2}$ per cent. per annum. Here again, it has not been deemed advisable to give money to the societies too cheap or to introduce the element of philanthropy. It is considered that it will strengthen a society to accustom it from the outset to the view that it cannot get money from the market except at what may be termed business rates. The Central Bank rules provide that, on the moneys lent by that Bank to rural societies, interest shall ordinarily be charged at 7 per cent. per annum.

7. *The Money-lender.*—Probably, the most promising sign so far as this Presidency is concerned is the attitude of the money-lending class towards co-operative credit societies. I have seldom met with any opposition from this class; and in a great many cases they gave me active help in starting these societies *to their pecuniary detriment*. For instance, the chief organiser of the Kilacheri Agricultural Bank is a money-lender who has been getting without any difficulty 12 per cent. per annum for his money. He not only started the bank but financed it by lending it a portion of his money at between 6 to $7\frac{1}{2}$ per cent. per annum, and what is more, in the organisation he has set up, he is

after all only one member of a committee which is entrusted with the management of the concern. Then again, in the last bank I started, that at Valur, four or five of the members are money-lenders who have not hesitated to throw in their lot with their fellow-villagers *on the basis of unlimited liability*, and as a great many of the other members are poor men, the risk run by the well-to-do members of the society is substantial. In regard to the attitude of the money-lending class, I cannot do better than quote from a speech of the present Director of Agriculture, the Hon'ble Mr. A. E. Castlestuart Stuart, to whose watchful care the co-operative credit societies of this Presidency cannot be too thankful:—

"The fact that the rural money-lender and local Nidhis have shown themselves friendly to the young societies is encouraging, and there is not the least reason why they should be otherwise. In this Presidency, the large majority of money-lenders are not professional Shylocks unconnected with the land and with no local interests; but are for the most part the leading agriculturists of villages who, by superior intelligence and enterprise, have risen to the position they hold as the financiers of their poorer brethren. The rates of interest they charge for loans are, by no means, as a rule, exorbitant, having regard to the security offered. The Madras Sowcar has played and is playing a useful and important part in village life, and there is no reason why he should not, as a member of his village Co-operative Credit Society, play an even more important part in the future."

8. *Governmental Action.*—The history of popular banks in Europe shows that these institutions sprung up in the Continent without any Government initiative or help and sometimes in the teeth of Government opposition. In India, probably Government initiative is inevitable in the beginning, but it has been recognised from the outset that special care must be taken to make it clear that these institutions are really private concerns—belonging to the people themselves—and not Governmental institutions. Under the notifications of the Government of India, Co-operative Credit Societies are exempt from the payment of stamp duties and registration

fees and income-tax ; and under India Act X of 1904, they get free audit as well as free registration. And there is also the fact that Government is prepared to subsidise rural societies on very cheap terms—very much cheaper terms than they can ever hope to get in the open market. It seems to me—I speak from experience—that these concessions go quite far enough. Probably, after a time, it may even be found necessary to withdraw at least one of them, namely, the grant of loans to rural societies so that the societies may learn to depend on themselves. Particular care has been taken to explain to every society that a Co-operative Credit Society is *not* a Governmental concern, that Government is *not* responsible for its solvency or management and that the obligation to audit does *not* include an obligation to look into the administrative details, etc. I think that it is a good thing that the Act does not provide any summary procedure for a society to recover the debts due by it. If it did, I fear that the extinction of these societies—as the result of excessive Governmental help—would be a foregone conclusion. While care is taken to make the managing Committee of each society realise fully that *they and not we* are responsible for the good management of the society, all societies are subjected to constant inspection, so that they may be kept up to the mark. To be brief, what is being done is to make the societies (by constant inspection) do their own work, care however being taken not to do any portion of it ourselves.

9. *Management*.—The management of rural societies is mostly gratuitous. In the case of urban societies, however—which work on a much larger scale than rural societies—it has been found expedient in some cases to provide that a portion of the net profits—a fourth or a third—shall be given to the board of management. It may however be noted that, in the case of the last urban society, that of Triplicane, the board of management have agreed to work gratis.

10. *The Reserve Fund*.—Most of the rural societies have enacted rules to the effect that the entire net profits shall, for all time to come, go to the reserve fund. Even the few rural societies whose rules provide for the grant of bonus to

members, have also rules to the effect that such grant shall not be made till the reserve fund comes up to a certain percentage (the rate varies from 20% to 50%) of the liabilities and till the ordinary rate of interest on loans granted to members is substantially reduced. In the case of urban societies, the usual rule is that a third of the net profits shall year after year go to the reserve. It is a matter for satisfaction that in every case, the organisers have realised the importance of building up a reserve fund and of keeping it intact to be drawn upon only to make losses good. Stringent rules to that effect have been adopted by all societies.

NOTE ON THE WORKING OF THE CO-OPERATIVE CREDIT SOCIETIES ACT (WITH SPECIAL REFERENCE TO BOMBAY).

By LALUBHAI SAMALDAS, Esq., *Bombay*

Agricultural credit is lower than that of the ordinary tradesmen, not only in India but all over the world, because the ability of the agriculturist to carry out his obligations to the money-lender depends on an uncertain factor—timely and sufficient fall of rain; because the turnover in his case is a slow one, and because there is usually no money-market in which a small agriculturist is as well known as the ordinary trader. Referring to the Italian peasant, Giustino Fortunato says, "He has no credit because he is destitute, and he continues destitute because he has no credit; and so he moves on hopelessly in the same vicious circle from which there is no way of escape." The condition of the peasantry in Germany, France, and other continental countries was almost the same. The remedy for this state of things according to Raiffeisen, lay in democratizing credit. He thought that there would be no difficulty in finding money on the security of collective liability; the only thing to be done was to group the elements of security. Since Raiffeisen started his first bank, thousands of banks based on

the same principle have been started in different countries of Europe, and they have done much to improve not only the material condition, but also the moral tone of their clientele.

In framing the Co-operative Credit Societies Act Government have generally kept in view the principles of the Raiffeisen Banks. The work of starting such banks has been taken up in the different Presidencies by the Registrars in concert with the local officers. In Bombay thirteen rural and two urban societies have been started up to now. While the United Provinces had a few agricultural banks in existence, and while Madras had its Nidhies and Kuttu Chit or Kuri Associations, we in Bombay had no such associations amongst us at the time of the beginning of working of the Act. This may partly be due to the Ryotwari Land Tenure and to the Individualistic tendency generated thereby. The absence of the idea of combining for depositing savings and for drawing money on the security of their savings, as well as that of their collective credit, necessitated the Registrars explaining to the *Raiyats* the benefits of co-operation in popular language. Leaflets were issued in English and the Vernaculars for this purpose. Model Bye-laws were framed and account-forms prepared and before their issue non-official gentlemen in close touch with the agriculturists were consulted. The Bye-laws for rural societies are on the lines of the model Bye-laws issued by the Irish agricultural societies. In the societies started up to now these model Bye-laws have in most cases been adopted without any alteration; where there have been modifications they have been very slight. In all the registered societies the liability is unlimited; the entrance fee is very small,—eight annas to a rupee—and only in one case is capital raised by debentures. The capital is ordinarily raised by taking fixed deposits from members, bearing interest at the rate of $6\frac{1}{4}$ per cent, and not repayable within five years. The more substantial members are the depositors; the amounts paid by individuals varying from Rs. 5 to Rs. 300. The total amount thus raised varies from Rs. 500 to Rs. 2,600. Government grants equal to the amount raised

by the societies with a maximum of Rs. 2,000 have been sanctioned in the case of those societies that have applied for the same. The Government grant is repayable in twenty annual instalments and bears no interest for the first three years. The Registrar is satisfied with the working of the seven societies in Dharwar which he revisited after they were started. In the city of Bombay we have started an urban society with a share capital of one lac of rupees divided into ten thousand shares of rupees ten each. With the idea of giving an opportunity to poorer people to join the society we have decided to receive the share capital by instalment of a rupee each. The society has been started with the idea of assisting the small tradesmen, the artisan and the mill-hand. It has been registered but lately, and began its work about a month back. The management will be a paid one as the society will have a large capital, over and above which it has the power to borrow an equal sum either from Government or from the outside public. If proper care is taken at the time of advancing money, and if the management is an efficient and an economical one, the society must prove a success.

It is also thought of starting an urban society in Bombay in order to supply capital in small sums to rural societies. The gentlemen who have undertaken this work have done so from motives of philanthropy and the management naturally is a gratuitous one. As the capital of the rural societies will be limited to the sum raised from the members as fixed deposits, plus an equal grant from the Government, subject to the maximum of Rs. 2,000, and as this amount will not suffice to meet the requirements of the members, it will be necessary for them to have extraneous assistance. In the beginning their credit will not be recognised by ordinary banks or individual *sowcars*; and the proposed society will thus be able to render valuable assistance to such societies by lending the capital at 5 to 6 per cent. The draft rules of this society have been approved by the promoters, but as they are business men with little leisure, the society has not yet been registered.

The forming of such a society for the sole purpose of finding capital for the rural societies raises the question of the liquidation of the existing debts of the agriculturists. One of the chief objections raised by the Pattidars of Gujarat who are considered to be the most intelligent of the agriculturists in those parts to these societies was that as most of the agriculturists were more or less indebted to *sowcars*, it was feared that if these people began to have dealings with the newly formed societies, their old money-lenders would become nervous about the recovery of their loans and would in view of the priority clause have immediate recourse to the Civil Courts and thus cause them trouble and annoyance. The remedy is to free the agriculturist from his existing obligations to the *sowcar*. The first part of the work, *viz.*, the finding of the money with which to pay off the *sowcar* will be done by the proposed urban society. The second part of the work, that of settling the existing debts by arbitration or otherwise, has to be done by Government. Such work was undertaken in the Central Provinces before the passing of the Co-operative Credit Societies Act. Sufficient time has not elapsed to judge of the results of this work. There were some who were afraid that the *raiayats* would undo the good work by again involving themselves—perhaps to a greater extent. The fears of these alarmists have not yet been realized. When the number of persons concerned is so numerous and usually so ignorant, there is a probability of some proportion of the relieved agriculturists going wrong in their old way: there is on the other hand an equal if not a greater probability of a large number of these persons improving their mode of life in view of their past experience of the money-lender and thus bettering their condition. A fresh feeling of hopefulness will be generated in their hearts, from which all hope and elasticity had been crushed by their impoverished condition; and they will under this new stimulus redouble their energies to reach the final goal—complete freedom from indebtedness. It is the duty of Government to give them a chance of starting in life without encumbrances, and if in spite of these advantages they will

perversely continue in their old habits, then—no blame at least will rest with Government for having failed to tackle the problem. Unless this is done the newly started Societies will not be able to do much good.

The rate of interest for loans in the case of societies in the Deccan and Karnatic is 9 $\frac{1}{2}$ per cent or half a pice per rupee per month. As the interest for fixed deposits is 6 $\frac{1}{2}$ per cent. and as there is no interest to be paid for the first three years on the amount of the Government grant, the difference between the interest received from members and that paid on capital will suffice to pay the secretary a nominal salary for his work. It has been proposed to pay the secretary one rupee per month *plus* a quarter or a half of the annual profits up to a fixed maximum. In Gujarat where the people have the intelligence to work a society, the rate of interest at which persons of ordinary credit can borrow money, is lower than the rate obtaining in the Deccan and the Karnatic, and consequently the number of societies formed in that province is much smaller than in other parts of the presidency. Moreover, the Gujarat agriculturist does not like to have the amount of his borrowings made public. He believes that his dealings with a *sowcar* are of a confidential nature, but fears that his dealings with a society will get known to the greater part of the villagers, and he therefore prefers to stick to his *sowcar*. In the Bombay Presidency the majority of the agriculturists either belong to the same caste or to castes that have the same social status; there is consequently no difficulty in the way of their working in unison. At Kaira in Gujarat the organisers of the society included Hindus and Mahomedans. It may be feared that the constant contact of these two factors will lead to conflict and bad blood. I, however, believe that if these communities continue to work together for a common object, their racial antipathy will gradually fade away and they will begin to appreciate the good points of one another. We have, however, another difficulty arising out of the agriculturists belonging to the same caste, and that is, the existence in a village of two or more parties opposing one

another. It is believed that the working of such societies will lead to an increase of factions and party spirit, as those villagers who would not receive advances to the extent asked for by them, will bear a grudge towards the members of the managing committee and form themselves into an opposition.

These difficulties—some of them conjectural and some of them real—will disappear if the work is taken up with the faith and the earnestness of a Raiffeisen. When the societies have shown good work, Government should show their confidence in them by utilizing them at the time of granting Takavi at the time of famine, or loans under the Land Improvements Act. These societies will be in a position to know the actual requirements of their members and hence if the money is distributed through their agency, no time will be lost in making inquiries. The money will reach the hands of the cultivator when needed most, and there will be less scope for corruption; again, if money is given for agricultural improvement through the agency of the societies, being on the spot, they will be able to see that it is used for the purpose for which it was lent. The confidence shown by Government will indirectly help the societies in another matter, as it will be sure to attract more deposits from non-members.

The ground has now been cleared, and the seed has been sown, but much still remains to be done to have good appreciable results. The Bombay Registrar has submitted his proposals to Government about the appointment of honorary organisers to educate the villagers from explanation of the principles of co-operation up to the submission of the application for registration and the subsequent initiation of the Committee into their duties. Here is work which ought to have attractions for all who have the good of the depressed masses at heart. Government could have done more in the same direction by following the example of Egypt and making arrangements with private banks, by granting them facilities for the recovery of their advances, for providing cheap capital to the agriculturists. That is, however, no reason why we should be deterred from supplementing the efforts of Government, and trying to make the working of the Act a success.

AGRICULTURAL ASSOCIATIONS IN INDIA.

NOTE by HENRY K. BEAUCHAMP, C.I.E., *Editor of the "Madras Mail"; Fellow of the University of Madras; Joint Honorary Secretary, Central Agricultural Committee, Madras.*

In the three words "Improvement From Within" may be summed up Dr. Voelcker's pregnant advice in connection with the development of Indian Agriculture, after an exhaustive examination of agricultural conditions in India. To that extent D. Voelcker was an out-and-out *Swadeshi*; and practically every competent critic and earnest student of Indian Agriculture has come to the same conclusion. But the improvement of Indian Agriculture along familiar Indian lines cannot be accomplished to any appreciable extent by spasmodic efforts on the part of individual cultivators here and there, or even by mere experiment and "demonstration" on the part of the various Agricultural Departments. There must be, amongst the cultivators themselves, co-operation and organisation, mutual help, mutual instruction, mutual experimenting; and the Agricultural Departments, in their turn, can help the general body of ryots hardly at all unless there are organisations through which the latter can be reached and persuaded.

Sir A. Fraser, Lieutenant-Governor of Bengal, who did so much to encourage the formation of Agricultural Associations in the Central Provinces, in notifying the creation of a Provincial Agricultural Association for Bengal at Calcutta, last year, said:—"The Agricultural Department has admittedly failed hitherto to make known among the people the results which have been attained by experiment. Accounts of the various operations undertaken are published annually, but they have not reached the cultivating classes; and even in the vicinity of the various Agricultural Farms improved methods of cultivation have not been adopted. There are many zemindars and merchants keenly interested in Agriculture, but their sympathy and co-operation have not been enlisted. In these circumstances, the Lieutenant-Governor

is of opinion that an agency is wanted to disseminate agricultural knowledge, and to awaken further interest in, and discussion of, the agricultural development of the Province." In the Central Provinces, Sir Andrew pointed out, the advantage which has followed the creation of advisory Agricultural Associations has already been immense.

Again, the Hon'ble Mr. A. E. Castlestuart Stuart, I C.S., Director of Agriculture in Madras, has remarked in this connection at a meeting of the Tanjore Agricultural Association :—"The formation of District Agricultural Societies of this kind—and I trust that before long every District in the Presidency may have such an Association, with a central organisation in Madras so as to bring them into the closest possible touch, not only with each other but with every branch of the Agricultural Department—affords gratifying evidence of an awakening desire of the people to co-operate for purposes of almost incalculable advantage to themselves, and gives Government the best practical means of helping those who thus show that they are willing to help themselves."

Since these words were uttered by Mr. Castlestuart Stuart, towards the end of 1904, the Agricultural Associations movement in Madras has made great strides, until now every one of the 24 Districts in the Presidency has a local Association, and some of the District Associations have already one or more Branches within their own area. It is hoped that in time every Revenue Division, every Taluq, and even every important village, or group of villages, will have an Association of its own. For although, owing to the peculiar conditions of India, it has been found necessary in Madras, Bengal, the Central Provinces and elsewhere, to begin to organise from the top rather than from the bottom, that is, to start Central Agricultural Associations for the Province first, and to develop District and Local Associations afterwards—the same procedure, by the way, having been adopted with quite remarkable success in Ireland and Ceylon also—nobody can help seeing that the movement, to produce any real and substantial results,

must depend mainly, nay entirely, on the practical work performed in the field of actual operations by the Mofussil Associations and cultivators themselves. At the same time the Central Associations at the Provincial capital will also have much useful work to do after they have succeeded in stimulating the organisation of Local Agricultural Associations in the Mofussil.

In brief, the purposes of the Central Provincial Associations would be to assist in establishing, and to aid and advise already established Agricultural Associations in the Mofussil ; to act as a medium of communication between the Government and these Associations ; to collect, collate, and distribute new information on practical and locally useful agricultural practice ; to study the proceedings of similar Associations and of Agricultural Departments elsewhere in India, and to communicate to the Mofussil Associations any information thus obtained that is likely to prove useful to them. The Mofussil Associations, in their turn, would communicate such information to their members and to the ryots generally by translating them into the vernaculars and publishing them in leaflets and in the special village sheets of the District *Gazettes*, or by bringing them up for discussion at meetings of their members.

There are other directions, of course, in which it would be possible for a Central Agricultural organisation to help in the improvement of Agriculture. It might, for instance, establish a permanent Central Exhibition of select agricultural products and implements. It might offer prizes, or induce others to offer prizes, for essays on select agricultural topics. It might do much to aid Mofussil Agricultural Associations in the holding of periodical Agricultural Shows. It might itself organise a Central Agricultural Show at intervals of a few years. It might, if funds permitted, or by collecting special funds for the purpose, depute persons to make special enquiries into special agricultural methods elsewhere in India, or even abroad. It might arrange for chemical analyses of soils, manures and agricultural products, and for special botanical investigations. It might do

something in helping to develop Co-operative Credit Societies, and in developing agricultural co-operation generally in matters such as the buying of manures, seeds and implements, selling of agricultural produce, the securing of favourable railway rates for agriculturists, etc.; and as the work developed it might establish a *Journal* on the lines of the *Journals* of Agricultural Associations and Societies in other countries.

As regards the Associations in the Mofussil, which must ever form the real backbone of the movement, the practical work before them is immense, and as varied as it is extensive. I might, by quoting from the Progress Reports of the Associations already at work in the Madras Mofussil, fill a fair-sized volume with suggestions of the kind of work that can be done. At the same time, of course each District and tract of country has its own peculiar needs; and these have come into special prominence in Madras since the Associations were started. Thus, the Associations in the West Coast Districts of Malabar and South Canara are devoting themselves first and foremost to the improvement of the cattle, which have been allowed to degenerate most woefully. Again, the rice-growing delta District of Tanjore is devoting itself first and foremost to alternatives to rice, and especially to sugar-cane, a most profitable crop hitherto practically unknown in the District. But with regard to the work that can be done by Mofussil Associations perhaps I had better content myself with quoting the example of Tanjore. A perusal of the Association's first Annual Report impresses one with surprise at the amount of good work which has already been accomplished. A collection of samples of improved agricultural implements; practical demonstrations in fibre-extracting, rope-making and cloth manufacture from plantain stalks; the establishment of several oil-engine pumping installations for irrigation purposes; the introduction of new and selected sugar-cane seed; the establishment of a model farm of eight acres of *padugai* lands; the creation of a Museum of Agricultural Products, with a Library of Agricultural Books, Bulletins and Reports;

the setting apart of model plots of land by private land-holders for experimental cultivation in conjunction with the Agricultural Department ; the establishment of a vernacular weekly journal for the dissemination of useful agricultural information on subjects such as the importance of various kinds of manures, of well irrigation, of new methods of cultivation, the introduction of new implements and new crops, and the adoption of extended cultivation of profitable crops such as sugar-cane, turmeric, etc. ; the supply, at cost price, of vernacular books on agriculture ; the introduction of improved agricultural implements from the Ceded Districts and elsewhere, and the instruction of local ryots in their use--such were the principal items in the Association's first year of working. And if so much can be accomplished by the Association in a single year—and that the initial year —what may not be accomplished as the Association becomes older, more vigorous and more experienced ?

As another more concrete example of the varied work that can be done by local Agricultural Associations, I am tempted to add here the following summary of the latest Progress Report of the little Association at Penukonda in the Anantapur District of the Madras Presidency, which was the first Association of the kind established in those parts :—

" The Penukonda Agricultural Society organised an Agricultural Exhibition in 1903, and a Cattle Show in 1905, and has resolved to hold another Cattle Show in 1906 during the car festival at Kottacheruvu. At the instance of Mr. Scott, the Collector, the Committee of the Society has decided to repeat the Cattle Show every year, which as a permanent institution is likely to improve the live-stock, on which successful agriculture so much depends.

" *The Krishi*, the vernacular journal of the Society, has been doing useful work in the way of educating ryots and disseminating useful knowledge in agricultural matters.

" The Association has purchased a fodder-cutting machine for Rs. 40, and five special grape thinning scissors, the grape industry being a special local industry for which the

Association has already done much. The use of Bordeaux mixture as a cure against milldew in the vines is becoming popular, and the thinning system has been introduced in the vineyards with success. A white variety of grapes has also been planted on the Society's Experimental Farm. The Society has further decided to introduce another variety of grape, experimented with and successfully grown by Mr. Dhone Subba Rao of Kurnool Road Station.

" In Fruit culture, the example of Mr. P. Srinivasa Charlu has had a wholesome influence on the inhabitants of neighbouring villages, with the result that several mango plantations have been planted in the district. The incentive given by His Excellency Lord Ampthill's present of Rs. 10 to a poor widow for growing figs at Penukonda has had an excellent effect and a considerable number of fig trees have been planted at Penukonda and other places. A new variety of plantain from Madura District is being grown on the Experimental Farm of the Society. The Society has procured a small consignment of Bengal Bale seedlings and distributed the same for trial.

"A large quantity of seeds of the Rain-tree and Mahogany were sent for and distributed for trial. Mr. H. Narayana Rao, B.A., B.L., has planted a number of Kanuga (Pungam) trees with a view to use the leaves as a manure for his lands, as an object-lesson to the ryots. A member of the Society has induced his pupils in the school to plant trees and take care of them in the school compound.

" The Society is encouraging the cultivation of sugar-cane, and several members have taken it up.

" Mauritius ground-nuts and other garden crops are being popularised.

" Chrome tanned leather buckets for well irrigation are being introduced into the district.

" Banku paddy is being tried by several members of the Society, the seeds of the same having been sent for from the Tanjore Association.

" About 50 varieties of cholum received from Surat are being tried and are reported to be better than the local

indigenous variety. But for want of better instructions as to the season for sowing and the necessity for irrigating the crop the trial seems not to have been very successful.

"Lima beans obtained from the Bellary Experimental Farm are under trial, in some places the seeds having sprouted.

"The experiment with the grass *Paspalum Dilatatum* as a fodder crop proved a failure.

"By the efforts of the Society a Rural Bank has been started at Bukkapatnam and it is expected that it will serve as an object-lesson for other villages. The Society has formed a Committee for considering the possibility of starting a Weaver's Co-operative Credit Society at Tadpatry. A few inhabitants of Hindupur have addressed the Society to help them in opening an Urban Co-operative Credit Bank at Hindupur.

"The fly-shuttle looms that were demonstrated at the anniversary of the Society and introduced later in important weaving centres of the district have been found not to work well for weaving very coarse cloths such as are made at Uravakonda; and accordingly the Society has sent for a fly-shuttle loom that will suit coarse cloths.

"A member of the Society has introduced the homestead system of farming at Kottacheruvu, Penukonda Taluk.

"It is gratifying to note that a few members of the Society at Kottacheruvu have made an offer to supply bricks for building a rural agricultural school according to the new scheme of the Hon'ble Dr. Bourne, the Director of Public Instruction."

It has again and again been urged that it is only by whole-hearted, indigenous self-help like this that the great agricultural industry of India can be radically, substantially and permanently improved. The marvellous change that has come over the face of agriculture in Ireland since Sir Horace Plunkett's rural Societies for the improvement of agriculture were established is an object-lesson which India may well lay to heart. For between India and Ireland, as regards general agricultural conditions, there are numerous similarities, at any rate, they are remarkably similar in the general

dead-levelness of agricultural practice and in the absence of co-operative instruction and effort. But in Ireland during the last five years there has been a quite extraordinary awakening in these respects, and the whole country is now studded with Associations and Societies, both Agricultural and Industrial, which are working nothing less than a revolution in methods and results. That very much may be done in India in the same way nobody can doubt for a moment. "At his best," Dr. J. A. Voelcker remarks in his Report on "The Improvement of Indian Agriculture," "the Indian ryot or cultivator is quite as good as, and in some respects the superior of, the average British farmer; while at his worst it can only be said that his state is brought about largely by an absence of facilities for improvement which is probably unequalled in any other country, and that the ryot will struggle on patiently and uncomplainingly in the face of difficulties in a way that no one else would."

There can be no doubt as to the truth of every word of this; but there is also no gainsaying the fact that the ryot's methods of procedure are too often laborious and old-fashioned, his implements more distinguished for the simplicity and rudeness of their construction than for the effectiveness of their operation, and his seeds year after year such as chance puts in his way instead of being intelligently selected. In such directions there is vast room for improved practice.

In a pamphlet which I published a few months ago I endeavoured to show what other countries had been doing in the direction of Agricultural Association and improvement. I pointed out how, in countries of the West, and also in Japan, there has taken place, during recent years, a most extraordinary development of organisation and co-operation in agriculture among the cultivating classes themselves, that is, apart from, though supplementing, State organisation and Departments of Agriculture. "The New Agriculture," as it has been not inaptly called; and the effect thereof on both the material and the social conditions of the peoples of these countries, has been described in many

most interesting books and pamphlets the most succinct, comprehensive and instructive of which is perhaps, "The Organisation of Agriculture" by Mr. Edwin A. Pratt, published by John Murray last year, and issued in a third and revised edition, at the price of one shilling, a few months ago.

It is impossible, within the prescribed limits of a paper like the present, even to summarise the marvellous records which the New Agriculture has achieved during the past ten years and less in countries so widely differing in agricultural conditions as Great Britain, Australia, Canada, Denmark, Germany, France, Belgium, Italy, Holland, Hungary, Austria, Switzerland, Scandinavia, Finland, Siberia, Servia, Poland, Luxemburg, Argentina and the United States, all of which will be found detailed in Mr. Pratt's book. In every one of the countries named, Mr. Pratt tells us there has been an agricultural revival which has led to the spreading throughout each of them of a more or less complete network of agricultural organisation, manifesting itself, in varying degrees, in the spread of agricultural education, and in combinations among the agricultural community for an endless variety of purposes, including the virtual transformation of farming methods in accordance with the latest developments of agricultural science; organisations for obtaining agricultural necessities of reliable qualities at lesser cost; the purchase in common of costly machinery which would otherwise be beyond the means of a small cultivator; the formation of Co-operative Societies for purposes both of production and of sale; the setting up of Agricultural Credit Banks as a means of keeping the farmer out of the hands of the usurer, and enabling him to carry on his operations more successfully; and the improvement of the individual lot of the agriculturist in many different ways. The special circumstances in which this network of organisation has been developed differ in each particular country, and it is a fundamental principle of the movement, regarded as a whole, that not only has each of the countries concerned differed from every other in establishing agricultural organisations

suited to its national conditions, but the greatest degree of success has been obtained where the Associations have been started on a very small scale in rural districts to meet local, or even parochial, conditions, and while maintaining their individual entity, have afterwards combined with other similar bodies to form district, country, or even national Federations for the attainment of common advantages.

As Japan and everything Japanese is just now attracting the widest and deepest attention in India, let us see what forms the New Agriculture has taken there. This we are enabled to do by studying a Report presented to the United States Government a few months ago by Consul-General Bellows. Now, as regards "small holdings" agricultural Japan resembles agricultural India in a striking manner. Thus in Japan, fifty-five per cent. of the families engaged in agriculture cultivate less than two acres each, 30 per cent. cultivate from two acres to a little less than three and three-quarter acres, and the remaining 15 per cent. cultivate three and three-quarter acres or more. Not only, too, are the farms small in themselves, but they are generally made up of different patches of land, so that a farm of two acres may consist of several non-adjacent lots, the average size of a lot being about one-eighth of an acre. The tools and appliances used are primitive in character, but the Japanese farmer fertilizes and cultivates in thorough-going fashion, thus securing an abundant harvest, besides often raising two or more crops a year on the same field. In the warmer latitudes, barley, indigo, beans, and rape are grown successively on one plot of ground within the space of one year. The other agricultural products include rice, rye, wheat, mulberries, sweet and other potatoes, millet, buck-wheat, tea, tobacco, cotton, and hemp. Stock-raising is in its infancy and poultry-farming is inadequately developed, eggs being imported from China to the value of £100,000 a year. On the other hand, the Japanese farmer generally follows some subsidiary occupation, such as rearing silkworms, reeling silk, or spinning. Alternatively he may work for wages in the intervals of his own farm work.

Such are the normal conditions of Japanese agriculture on which the organisation scheme fostered by the Government is being developed. That scheme would seem to be mainly of a three-fold character—legislative, educational, and financial. Under the first head are comprised laws respecting irrigation, the protection of forests, the control of rivers in the interests of the farmers, the re-arrangement of farm boundaries, and the formation of Farmers' Guilds. Under the second head the Government aids the local Treasuries to maintain six Agricultural Schools for the instruction of farmers' sons in the general principles of agriculture, surveying, veterinary science, and kindred subjects. The Government also conducts an experimental tea farm on which is a curing workshop, a laboratory for investigating the diseases of cattle and poultry, a cattle-breeding pasture for improving the native breeds of cattle for meat and dairy purposes, and two horse-breeding pastures for promoting the introduction of better horses. As regards Farmers' Guilds or Agricultural Associations, we learn that they are formed by the farmers (under the auspices of the Government) "for the promotion of their common interest"; but when organised in conformity with the prescribed conditions, they are further permitted to borrow money from the State Hypothec Banks under conditions much more favourable than could be secured by farmers acting independently. The Guilds also undertake works for the common benefit, and especially those that relate to controlling the course or the volume of rivers, irrigation and drainage systems, road-building, reclamation of uncultivated land, measures for protection against insect pests, and similar enterprises.

But leaving Japan, let us see what can be done in the direction of Agricultural organisation by a country much nearer India. I refer to Ceylon. There the movement was started last year on the personal initiative of His Excellency the Governor, Sir Henry Blake, who had seen what useful work such Associations were doing in Jamaica. Although the Ceylon Agricultural Society was started only last year, there are already over 40 local Branches of the Society in

the island. The central Society itself numbers over 700 members, and there are probably three or four times as many more who are members of the local Branches only. Out of the central Society has been formed the Ceylon Board of Agriculture, which is not only the executive body of the Society itself, but practically the Department of Agriculture in Ceylon. It has non-official as well as official members; but the official element in it comprises all the official Agricultural experts, and it has been entrusted with very large powers by the Government. The Ceylon Agricultural Society, working through and with the Government by means of the Board of Agriculture, "diffuses" information most thoroughly. The following are the advantages offered to members, and also, of course, to members of branch Societies in the Districts :—

"(a) You will receive all the latest information on matters affecting the Agricultural interests of the Island, e. g., directions for the cultivation of new products, hints as to the best soil, the best manures and the best markets, the results of experiments in farm products, improvement in live stock, etc.

"(b) Your efforts in pioneer cultivation will be generally assisted by the officers of the Government Botanical Garden at Peradeniya, and in cases favourably reported upon, Government assistance may be given.

"(c) Your suggestions as to improvement in cultivation, etc., will be fully considered and will obtain the benefit of full publication and discussion at Meetings of the Board and through the Journal of the Society, the latter will, it is hoped, enable agriculturists to impart and obtain information and offer facilities for exchange and disposal of farm produce.

"(d) You will be taking part in a scheme for the general improvement of agriculture throughout Ceylon, and by assisting in a general movement will enable Agri-Horticultural knowledge to be more readily and widely disseminated than is at present possible."

Considering the thorough and energetic way in which the Ceylon Agricultural Society has gone to work under the patronage and experienced guidance of His Excellency Sir

H. Blake, it is not altogether surprising to find that such excellent results have been attained. The fact that over 40 local Branches of the Society have already been established is sufficiently noteworthy. And these local bodies are actually *working* bodies, as may be gathered from the particulars given in the excellent monthly Progress Reports of the Society.

If Agriculture can be "organised" on such lines in Ceylon, surely it must be possible in India also. Personally I cannot help thinking that Agricultural Associations are more suited for growth in India than in many other countries. For one thing, agriculture is *the* industry of India, hugely preponderating over all others. It is regarded as the most honourable of all industries. To possess land is to possess status. It is in land that practically every native of India who has money to spare, prefers to invest that money,—from the prosperous Vakil and pensioned public servant to the returned coolly emigrant. Under present out-of-date methods of agriculture the return on the capital invested may be small; but the predilection for land is such that that is cheerfully enough accepted.

Now, this consideration is not merely academical: it has, as I will explain, a direct bearing at the present day on the prospects of organisation and combination in Indian agriculture. If such organisation and combination are to be initiated and developed, there must be local leaders—agricultural experimenters, demonstrators, and businesslike organisers. Are these to be found? Not, surely, it will be argued, amongst the great mass of those land-holders and ryots, pure and simple, who hitherto have shown no ambition to advance beyond local agricultural practice, no desire to try new methods or new crops. But it happens that we have, within comparatively recent years, arrived at a period when the first batches of Indian officials, Vakils, Pleaders, etc., educated on Western lines, have reached the time of life when they can retire from active employment and devote their time and means and talents to other pursuits for the rest of their lives. Imbued with the prevailing

spirit of India as regards the holding of land and the honourableness of agriculture, a large proportion of these men instinctively turn to the land to afford them interest, occupation and livelihood for the remainder of their days. Certainly, then, it is amongst these men that we may hope to find leaders, good and true, of movements having for their object the improvement of agriculture and the development of agricultural organisation and co-operation.

As I have remarked elsewhere, it would be the greatest mistake, everybody must admit, for these Mofussil Agricultural Associations to become in any considerable way "official" in character, for that would stifle individual enthusiasm and diminish effort amongst the very classes upon whose enthusiasm and effort their success must ultimately depend. But, at the same time, the countenance and friendly advice of officials are essential to the success of the movement, especially in its initial stages. In the Central Provinces and in Bengal, where Sir Andrew Fraser has done so much to stimulate agricultural organisation, the Agricultural Associations appear to have assumed a preponderatingly official character which will certainly be found a great mistake in the long run. The Government's interest and actions are sufficiently well represented and centralised in the Agricultural Departments, and the uses and functions of Agricultural Associations are distinct from, though supplementary of, the proceedings of Government.

If the nascent spirit of *Swadeshi* is to stimulate any real substantial work for India's progress, surely it should predominate in the greatest of all Indian industries, *viz.*, Agriculture. Here "mother-earth" and "mother-country" have a co-relation, a community of sentiment, that they have nowhere else, and it behoves every son of Mother India to do the utmost that lies in his power to make two blades of grass, two ears of corn to grow where only one grows at present.

THE WORK OF THE NORTH ARCOT DISTRICT AGRICULTURAL ASSOCIATION.

BY JOHN KENNY, Esq., *Honorary Secretary.*

To begin with, our Association recognises two main difficulties :—(1) that we have much to learn, and (2) that there are immense obstacles in the way of enlisting recruits to get the ryots to combine. Our chief aim at present is to bring landlord and tenant together to exchange ideas and to show both that in combining, they do so for a common good.

We do not advocate new ploughs and new methods of agriculture, but endeavour to supply the wants that are actually felt, confident that if this be done with advantage to the farmer, the road to further reforms will be easier and certain, that no good will come of our efforts unless we practically prove that we can do good.

Now in this District, and it appears to me the same holds good for a great many parts of India, the difficulties that beset agriculture are a want of sufficient water and an absence of cattle manure. The "Madras Mail" is having the question of field irrigation, threshed out in its columns, and we, as other Associations, are watching the matter with interest. If it can be clearly proved that the oil-engine and pump are the most economical, our efforts will be directed to co-operation for the purchase and use of such necessary aids. But *festina lente* is our motto. The next question is the one great difficulty that will shortly be solved, *viz.*, that of manures. All over the country the people know and appreciate the value of cattle manure and their knowledge of the virtue of various leaves is astonishing. But both these are badly wanting, and it is plain to the naked eye that year by year fields are less productive. It is true that in India the process of decomposition goes on more rapidly than in cooler climates, but, for the very reason the soil appears to be more rapidly robbed, till fields become absolutely worthless owing to their total deprivation of plant foods. As natural manures fail, concentrated fertilizers must

take their place, and it is our endeavour to accustom the people to the use of these and show them that their harvests improve and the land, far from being hurt, is greatly benefited by their application. With Dr. Voelcker we believe that the ryot has not much to learn from Europe. Where deep ploughing is required, as in the stiff rich clays of Cuddappah, the heavy plough of the country is used. Where deep ploughing would denude the soil, the ordinary plough scratches the surface. With these no interference is advisable. But where the peasant says a manure is not good because there is no unpleasant odour attached to it, we must by practical experiments correct his notions, as the ideas of the peasants in Europe were changed in this respect not long ago. If the ryot can be persuaded to do this an immense benefit will be done to him and to the country and only when he sees an increase in his crops far above the money value of the measures purchased, can the next stage be entered upon, *viz.*, trials at introducing new varieties of better paying crops and combination to effect this and similar objects.

We do not think it wise to tell the ryot that his ancestors for thousands of years were all wrong in their ideas of ploughing and sowing and agricultural work in general, nor can we tell them their manures are faulty ; but we can help them to a knowledge of such concentrated fertilizers as will take the place of the old manures that are now difficult to obtain in sufficient quantities, and on demonstration farms we can show that other and perhaps more paying crops can be introduced into the District and grown with advantage to the people. This we are doing. There is a model farm on the spot belonging to Messrs. Parry and Co., and there the ordinary crops of the District are grown without manures. With the ordinary manures used by the ryots and with complete concentrated fertilizers, new cottons and other crops are thriving and all interested in agriculture are invited to visit the farm. During our meetings all these matters are discussed as well as the treatment of insect pests, and representatives from the various parts of the

District where the lands are rich and poor, give their experiences and their difficulties in farming. It is so far not an ambitious scheme. We do not make many learned experiments as to what may or may not be grown in pure sand with various additions of single manures. All this is done by learned people in Europe.

From the result of their experiments we endeavour by the use of complete fertilizers to bring home to the people the utility of manuring and the profit to be derived from it. We do not classify varieties of plants but endeavour to get a better crop from each of the indigenous ones, and in introducing foreign species we attempt to show that they can be grown with profit. Later on co-operation for purchases and sales will follow, and I believe a co-operative credit bank is already in course of formation in this District. The programme is not large nor very ambitious, but it suits the simple people of this District, and if it does a little good, it will justify the existence of the North Arcot District Agricultural Association.

IMPOVEMENT OF SERICULTURE.

By N. G. MUKERJI, Esq., M. A., *Assistant Director of Agriculture, Bengal.*

In the matter of sericulture it is possible for this Conference to take some definite action to the great advantage of the country at large. If you are disposed to introduce any of the agricultural improvements I have suggested, you can do so without extraneous help and combined action. But in the matter of the improvement in sericulture I am going to mention, combined action, organisation and expert guidance are essential. For the past 19 years Government has been fostering sericulture with a certain amount of organisation and expert guidance, and the result has been very considerable. You cannot fail to have noticed how popular the wearing of silk and imitation *endi* silk specially, has become. The net result of this development may be best illustrated by quoting the

census figures for 1891 and 1901 for silk-weavers. While in 1891 there were 27,301 silk weavers in Bengal, in 1901 there were 43,836. But the industry is capable of enormous development on the native side if we combine to lift up the industry. The time for action on the part of our countrymen has arrived, and I would recommend nothing with more confidence than the working up of the silk industry. If a company is formed I am willing to take furlough and to set the operations in working order if Government will allow me to do so, and Government will perhaps lend my services for such an object. I would choose Gurdaspur district in the Punjab where there are thousands of large mulberry trees and about 500 silk rearers, as the field of my operation. We are dreadfully handicapped in Bengal in not having mulberry trees. The shrub-mulberry costs from Rs. 60 to Rs. 75 per acre keeping up. The large tree costs nothing when it is once grown up. The industry of Bengal is handicapped to this extent at the start. In Italy, in France, in Kashmir they use the large tree. To work sericulture on economical lines we must have the trees. In the Punjab we have the trees. Pebrine, however, has ruined the silk-rearing industry of the Punjab. I would go to Japan and bring from that country seed after microscopic selection under my own supervision. Kashmir has been fearfully cheated by French graineurs in this matter. They have been systematically supplying diseased seed guaranteeing it free from disease. But that is the way with European graineurs. Getting out from Japan, which country has the choicest classes of cocoons, selected seed for 500 Punjabi families, at 2 ounces per family, that is selecting out 1,000 ounces of seed, will require the constant labour of 3 persons for 5 months (*i.e.*, from June to October). As this will be once for all, this must be done, and if I were to bring out 1,000 ounces of microscopically selected seed from Japan, I must have two assistants to help me. By the application of M. Pasteur's system the ravages of Pebrine can be certainly met most successfully. Having got the seed in the month of November, it has then to be hibernated in a dry and cold

hill-station, and we shall require a small house at Dalhousie for this purpose. In spring the seed will have to be brought down to the plains of Gurdaspur distributed among the cocoon rearers and reared by them under a certain amount of supervision. Then the cocoons will have to be collected and reeled and sold to the weavers of Benares, Amritsar, &c. From the second year there will be profit, and a capital of a lakh of rupees will be more than sufficient to rehabilitate the Punjab silk industry. I hope to be able to show a dividend of at least 16 per cent. after the second year's operation. In the first year the expenditure will be abnormally high, but from the second year the seed will be selected in the country itself. The *Bombyx mori* cocoons which are the best and which I would bring for the Punjab are reared in Kashmir. The Kashmir silk industry is not altogether unprofitable though they have been getting out diseased seed and getting from only $\frac{1}{8}$ th to $\frac{3}{4}$ th of an average crop. With seed free from disease we expect to get a more than average crop, *i. e.*, more than a maund of green cocoons for every ounce of seed we use. The gross produce on the first year from 1,000 ounces of seed ought to be at least 1,000 maunds of green cocoons and 100 maunds of raw silk. At Rs. 800 per maund (at which price the silk can be easily sold in Europe) the price of this silk would be Rs. 80,000. Sold in India at Rs. 16 per seer, the gross value of the silk would come to Rs. 64,000. The reeling expenses ordinarily under native management come out of the sale of the waste. In making 100 maunds of silk about 25 maunds of waste would be made the value of which at Rs. 80 per maund would come to another Rs. 2,000. But in the first year the expenses would be very heavy. The 1,000 ounces of seed brought out from Japan, with travelling expenses and pay of two assistants would come to Rs. 7,000. The buying or building of a hibernation and seed-selection house at Dalhousie would cost perhaps Rs. 3,000. The erection of a filature with 100 basins will cost Rs. 10,000 and another Rs. 6,000 would be the cost of the boiler. Quarters for the superintendent and assistants may cost another Rs. 8,000. The purchase of 1,000 maunds

of cocoons at Rs. 20 per maund would come to Rs. 20,000. The filature will cost in 2 months in which time the cocoons should be reeled off, Rs. 4,000. If I were to add to this the cost of leasing the 20,000 trees that will be required to rear the 1,000 ounces of seed, say at 4 annas per tree, that would be another Rs. 5,000. Added up these items make up Rs. 27,000 against the capital account and Rs. 36,000 against the annual expenditure. Besides these main charges there would be other smaller charges, the total of which would come to another Rs. 4,000. Thus there would be no profit the first year ; but the second year none of the Rs. 27,000 calculated against capital account would come, and seed would not cost Rs. 7,000 but only Rs. 1,000. Thus against an expenditure of Rs. 34,000 I expect an income of Rs. 64,000 the second year. There will be time then to think of further extensions and developments in other directions, e. g., milling, weaving, &c. Half the profits may be reserved and the rest divided among share-holders.

We must try to get a few leading zemindars and influential people of Pathankot, Gurdaspur, &c., as our share-holders, and we must get the Collector of Gurdaspur interested. Then we will be able to get the people to take to silk-rearing again more easily. Messrs. Lister & Co., failed. But that is no reason why we should fail. We will avoid all mistakes. We will employ only expert sericulturists. We will follow only the most approved method dictated by science and experience. We will retain all the economical methods of the native system of rearing and reeling and deviate in those points only where deviation will be profitable. We will be able then not only to carry on a profitable business, but establish a beautiful and lucrative industry among the people of the Punjab who have not as yet forgot the art of rearing and reeling silk.

The scheme here proposed will be difficult to carry out unless we have the support and sympathy of Government and the local landholders of the Punjab. There are many in the Punjab acquainted with the art of reeling silk, and it is possible we will not receive the whole quantity of

cocoons that are reared. This point must be first settled with people who are thoroughly acquainted with the character of the Punjabis. Are they likely to secrete the cocoons, or sell them all at a fair price fixed for them from beforehand, *i. e.*, at Rs. 20 per maund of green (fresh) cocoons, the arrangements for seed and leaf being made by the company.

If it is considered by men acquainted with the character of the Punjab peasants, that the cocoons will be chiefly secreted and sold elsewhere or converted into silk, the scheme of running a hibernating and seed-selection house at Dalhousie may be carried on only as a philanthropic undertaking by this Conference with the help of Government and the idea of a Joint Stock Company and of reeling abandoned. The seed may be given away free to the old silk-rearing families of the Punjab in the first year, and sold from the second year. The cocoons for seeding from the second year will be chosen from the best rearings in the Punjab.

The establishment of a grainage and hibernating station will have a wide scope of usefulness throughout India, in improving the sericulture of those places where the industry already exists, as Bengal, Assam, Kashmir, and Mysore, and giving a great impetus to the industry where it is still in an experimental stage, as in Baroda, Agartala, Mourbhanj, Keonjhor, and Dhenkanal. A Bengal cocoon contains a continuous fibre of silk thread $\frac{1}{4}$ th in length and a Mysore cocoon $\frac{1}{3}$ rd in length of a European cocoon. This is why European silk is much finer and better silk than Mysore silk and much more so than Bengal silk. The two difficulties about introducing European cocoons into India hitherto have been, that (1) Italian and French graineurs in the interest of their own country have a tacit understanding that they will supply only diseased seed to Asiatic countries, and (2) that the eggs of European cocoons require to be protected from great heat during the summer months and hibernated in dry and freezing temperature in winter. Darjeeling climate is not the best for conservation and hibernation of the seed, though Kashmir and the Punjab climate of high hills is. The sericulture of all parts of India can be enormously

improved if seed properly conserved and hibernated in a place like Dalhousie, and selected free from disease by microscope, were distributed all over India.

In this work the Bengal Silk Committee, the Assam and Bengal Governments, the Native States of Kashmir, Mysore, Baroda, Hill Tipperah, Mourbhanj and others, should be vitally interested, and we should have no difficulty about getting pecuniary assistance if we ran the Dalhousie station simply as a source of supply of healthy seed to whoever wants such seed.

MINING, METALLURGY, MINERAL AND METAL WORKS.

By RAO BAHADUR G. V. JOSHI, B.A., *Head Master, Government High School, Satara.*

These constitute an important department of national industry, and in any scheme of economic revival and reform, are entitled to a prominent place. They present a most fruitful line of effort, and suggest a boundless vista of possible development. Our mineral wealth is immense ; and there is no sphere of industrial work in which the openings are so many, and the prizes so great. It was at one time a flourishing industry in the land, giving employment to a numerous section of the population. But it has since shared the fate of so many of our other industries, and perished in the general economic cataclysm that has swept over the land, sending our minors to the plough, or forcing them into the ranks of landless and casual labor. The field, however, is there—vast and rich—open to our enterprise; and it rests with us to properly work and develop it. The economic need is imperative for the endeavour, and we have at present unrivalled opportunities which may not always recur. And now that there is such a national awakening to the economic situation in the country and its necessities,—there is, we submit, no more urgent or important question that can engage the deliberations of the Conference than that which

has reference to the rehabilitation of this ancient and glorious industry. As a humble contribution to such a discussion it is proposed in the following pages to submit a brief general survey of the position as it at present exists, and respectfully offer a few suggestions with a view to practical action in the matter.

Our mineral deposits are rich and varied. We have diamonds and rubies, gold and silver, copper and lead, iron and coal, mica and aluminium, marble and lime-stone, and in fact every useful mineral we need for our purposes. As Mr. Ball puts it (Ec. Geol., p. 1) "Were India wholly isolated from the rest of the world, or were her mineral productions protected from competition, there cannot be the least doubt that she would be able, from within her own boundaries, to supply very nearly all the requirements, in so far as the mineral work is concerned, of a highly civilized community."

(a) In India *diamonds* occur over three wide areas:—
 (1) The Eastern side of the Deccan from the Penner to the Sone, (2) Madras, Cudapah, Karnul, Ellore, Krishna and Godavari basins, and (3) Chutia Nagpur and the Central Provinces to Bundelkhand. They are found in alluvial deposits—in beds of sand and clay, in ferruginous sandstones and in conglomerates. The best diamonds are those from the Krishna district and from Panna in Bundelkhand. The matrices are still undiscovered. The surface workings in several parts of these areas show signs of exhaustion—and indeed large diamonds have not been found for years. Both practical and scientific opinion, however, leans to the view that rich beds lie below as yet untouched. Considerable tracts in the Madras Presidency of the diamond Banganapally conglomerate are still untried. There are besides large conglomerate beds in the Krishna district to which belonged the old mines of Collur and where the Kohinoor was obtained. The Ramal-Cottah and Banganapally mines are still worked, and yield a remunerative supply of small and rough diamonds. There are promising areas in the Nizam's dominions which the Deccan Mines Company has recently had investigated and reported on by a

distinguished expert. In Bundelkhand there are the Panna mines. The ground here consists of ferruginous gravel mixed with reddish clay which is washed for diamonds. The matrix evidently lies deeper. There is a still more important tract lying north-east of Panna where large diamonds though not of the first water are obtained ; and, here, according to Pogson, "inexhaustible strata producing diamonds exist." Presumably as in South Africa, so in these Indian diamond tracts. The workings have hitherto been confined to alluvial deposits, sandstones and conglomerates. Apparently the eruptive detritus of low-lying inferior rocks spread over the river valleys, and it would seem necessary to extend the search to greater depths and through "pans" or "pipes" running down into the inferior strata through which volcanic matter has forced its way to the surface bringing diamonds with it from some lower matrix. There can, however, be no doubt as to the vastness of the treasure that lies hidden here in these diamond fields ; and science will guide effective search. Our gold deposits are even richer and more extensive.

(b) *Gold* occurs in India in the quartz reefs which traverse the metamorphic and sub-metamorphic series of rocks, in the alluvial deposits resting on these rocks, and in places in chloritic schists and quartzites and certain forms of gneiss. All along the foot of the Himalayas from West to East the territory rocks which flank the bases of the hills are auriferous, the gold obtained being all detrital, derived from the crystalline metamorphic rocks of the higher ranges. In the Panjab, most of the rivers and streams—whether rising in the higher or lower ranges—contain gold. In Assam, there are auriferous deposits of considerable economic value. Most of the streams contain gold-bearing gravel—the Subansiri and Desovi rivers particularly. In Chutia Nagpur gold occurs in considerable tracts, the richest deposits being in the north of Singhbhum and the south of Manbhum in alluvial sands, gravels, and conglomerates. At Sonpet there is what looks like a fine quartz matrix. By far the most valuable deposits, however, are found in Southern India. In Malabar and the

Wynaad the metal occurs in the reefs or large lodes of quartz, in the leaders or spurs from them and in the casing rock. Mr. B. Smith's report of 1879-80 mentions a tract here some 510 square miles in area, in which there are 200 out-crops, richer and wider than in any portion of Australia. In Mysore, the Kolar gold fields are well known, and their success proves that gold exists in richly paying quantities in many of the lodes running through the Dharwar schists, and lodes of equal richness exist elsewhere, too, in the series. And in the opinion of Mr. Foote, the mining operations at present in progress tap only to a small extent the gold-bearing rocks of Mysore. Over the whole extent of the Province from North to South run well-marked bands of Dharwar schists so rich in auriferous deposits. The Kolar band is only an out-lier of limited extent. Of the great bands traversing Mysore, the western is said by Mr. Foote to be the largest and least known, being covered by the dense forests of the Western Ghats. In the Bombay Presidency, the district of Dharwar is rich in auriferous deposits which are found in these district series of rocks. Lastly we have gold sands in so many of our rivers.

(c) As regards *Copper* it is not an extensive deposit, but where it occurs, it is of considerable richness. It occurs both in the older crystalline metamorphic rocks and also in several of the groups of transition rocks, e.g. in the Cudapah and Aravali series. The most extensive copper deposits are in the district of Singhbhum and the State of Dulbhumi. Copper ores occur in the Madras Presidency in the districts of Cudapah, Karnul, Nellore, in Rajputana, in Ajmere, and in several Native States; in the United Provinces, in Kumaon and Gurhwal; and in Bengal, in the Hazaribagh district.

(d) *Silver* is a deposit of still more limited extent. It seldom occurs native, but is found alloyed with gold as in Mysore in some places, or associated with lead and copper. Argentiferous galena abounds in the districts of Cudapah and Karnul in the Madras Presidency and also in the Bhagalpore division of Bengal. Native silver in small quantities occurs

in the Kappalgade hill streams in Dharwar in the Bombay Presidency.

(e) Passing on to *Iron*, we find, our supplies of this most useful of minerals are of surpassing richness in extent in both the British Provinces and the Native States. Indeed there is not a district in the country where iron ores are not to be met with in more or less abundance. In parts of the Peninsula, the deposit is simply magnificent—far even beyond the dreamer's dream. In the Salem district of the Madras Presidency, the development of the ore is on a scale of unparalleled magnitude, whole hills and ridges being formed of the purest varieties of it; the deposits are not lodes but true beds of marvellous extent and thickness, and the ore obtained is of the best quality and in quantities to be estimated only in thousands of millions of tons. In the Chanda district of the Central Provinces, the iron ores exhibit wonderful richness and abundance. Near Dewalgaon, there is a hill named Khandeshwar which is 255 feet high and the whole mass is laden with ore enough to furnish the whole of India with iron for years. The iron ores of the Raniganj field in Bengal occur in iron-stone shales 1,400 feet thick; and in case of iron works being established here, regular mining for years would not be necessary for a long time. Even in Sind we have masses of magnetite and bands of brown *haematite* of considerable richness. In the State of Gwalior remarkably rich deposits occur; and so do they in many other Native States.

(f) As to *Coal*, India possesses extensive stores none belonging to the carboniferous period. The whole deposit as far as ascertained, occurs in the rocks of the Gondwana System; and the coal measures exist only in the Central and North East Provinces, in Western Bengal, the lower Provinces and the Nizam's territories. The coal area is estimated at 35,000 square miles, and the amount of coal at over 40,000 million tons. The most extensive coal-field is that of Raniganj situated on the rocky frontier of Western Bengal 120 miles from Calcutta, the available coal estimated at 14,000 million tons.

Space does not permit of any more details being added here regarding these mineral deposits. Besides, the work of exploration is still incomplete, whole areas lying untouched, particularly in the Native States. Malwa and Kattyawar, Cutch and Bundelkhand, Rewa and the Nizam's dominions are in this respect more or less still a *terra incognita*. Enough, however, it is hoped, has been said to convey some general idea of the practically boundless wealth we possess, hidden in the Earth's Crust. Broadly speaking these mineral deposits constitute for us an underground store of capital of immense value (our coal deposit alone is worth 20,000 crores rupees). Nature's generous gift to us which—if we should only know where and how to find them and turn them to use—would prove a most important help to us in our future industrial developments. Iron and coal are the ground-work of England's material prosperity; in France and Germany, they are also the main foundation on which the new industries have been built up. In Australia, it is to their mineral resources that the colonies owe the proud position they hold in the Empire as the richest colonies. Here gold was first discovered in 1851; and from that year to 1899, 368 millions pounds sterling worth of the metal was obtained. Silver to the value of 29 millions, copper 30 million pounds sterling, and tin 12, together forming a total mineral output during the period of close on 440 million pounds sterling: and an economist remarks, the *development of manufacturing* and other industries in these colonies followed as a natural sequence to the acquisition of so rich a treasure. In India, our hidden heritage, to be sure, would not prove of less service.

So richly endowed by the bounty of Nature, India from the earliest times of which there is any record down to within a few years of the British occupation, was one of the foremost mining countries in the world. She was able not only to meet from her resources her own local wants, but also sent to far off lands some of the finest products of her mines. For centuries and up till 1727 when Brazil entered the market with its cheaper stones obtained

from the mines of Minas Geraes, India alone supplied diamonds to the world. The Koh-i-noor of the British Crown, the Orloff in the sceptre of the Russian Czar, the Pitts diamond among the State jewels in France, and several others, in the possession of the princes and magnates of Europe, are from our mines. China got her silver from us. Our iron was held to be of superior quality and was much sought after by the foreign merchants. Indian steel was highly prized for its fine temper and found ready sale in the markets of Persia and England. Firearms and swords damascened on gold and covered with gems passed across the frontiers. Our damascening on iron and steel as turned out even to this day commanded high prices. We had iron foundaries in the country capable of turning out work like the wrought iron pillar close to the Kutub at Delhi, the iron girders at Puri, the ornamental gates of Somnath, the 24 feet wrought iron gun at Nurwar, which afforded a theme of wonder to succeeding generations.

Megasthenes wrote some 300 years B. C. :—“India has underground numerous veins of all sorts of metals, for it contains much gold and silver and copper and iron in no small quantity and even tin and other metals which are employed in making articles of use and ornament as well as the implements and accoutrements of war.” And, so contained India for centuries afterwards. All accounts go to show that this mining and metal industry was in those days a large and flourishing industry in the country. We had a numerous population of miners and metal workers and every branch of the industry was more or less strongly represented. The work was carried on an extensive scale and over large tracts; and our miners—though without outside light or guidance—whether working for diamonds or gold, copper or iron, showed remarkable skill and resource in their processes and great boldness and expert knowledge in their operations, of the capabilities of the tracts in which they worked.

Diamond diggings were extensive in the diamond tracts. Traces of old workings are numerous. Pits in gravel and shafts of varying depth with horizontal galleries run gangue

to get at the seams of diamond gangue are still to be seen. Even dredging was not neglected where necessary. There were diamond mines in the Cudapah, Karnul, Goda and Krishna districts in the Madras presidency, in the Chanda district and in Chutia Nagpur. In Karnul up till within a few short years ago there were over a dozen places where we had both rock workings and alluvial washings for diamonds. Chenur and Cunnapurjee in Cudapah, Manimadagu in Bellary, Colur, Partial, Meluvilly, Sambalpur, Jashpur, Pauna were among the leading centres of the industry. There was diamond polishing in most of these places also.

Gold minings was perhaps next to iron and lead—the most extensive branch of the industry giving employment to numerous classes. Malabar and the Wynnaad, Mysore, Dharwar, Chutia Nagpur, Singhbhum, were among the chief seats of gold mining. The miners quarried on the outcrop or sank shafts and with adits. In the Malabar they cut them in hard solid quartz, 60 to 70 feet deep, with smooth and plumb lines, and pounded the stone with hand mullers. In Jashpur on both sides of the river Ebe the tracts were simply honey-combed with shafts sunk by successive generations of gold seekers. In parts of Chutia Nagpur stone crushers are to be met with in numerous villages, which were used by the gold miners. Amalgamation (and the use of mercury) was well known. Gold washing was an important industry. In the Panjab, in Assam, in Orissa, in the Central Provinces and even in Kattyawar and Rajputana, as also in Chutia Nagpur, large numbers lived by washing the sands of rivers and streams for gold. In Assam not long ago there were some 15,000 to 20,000 persons engaged in this gold washing.

Silver.—There were numerous mines of silver in Southern India, in the districts of Cudapah, Karnul, and Malabar. Silver was extracted from Argentiferous galena at Jaungaram-razpilly in Cudapah to a large extent. There was also some silver working in Rajputana and in the Bhagulpore division in Bengal. There were silver mines in Assam, too.

Copper.—It was extensively worked in Karnul, in Bellary, in Nellore where 'hills' of copper-slag occur to attest the extent of old workings in Hazaribag in Bengal where countless mounds of slag are still to be seen and in Rajputana and in many Native States.

Lead.—According to Mr. Ball from whose invaluable work on the Economic Geology of India these details are quoted, there is probably no metal in India mined and worked to so large an extent except iron,—and we have old workings scattered in so many parts,—in Southern India, in Rajputana, in Bengal, &c.

Iron and Steel.—This represents the largest department of our old mining and metal industry. There is not a district in India—scarcely a village—but had more or less iron smelting and iron work. In North Arcot, for instance, in 1885 iron ore was mined in every taluka and there was iron smelting in 86 villages. Bangalore was noted for both iron and steel. Steel-making at Nirmah in the Nizam's dominions had a world-wide reputation. Narsingpur in the Central Provinces turned out excellent iron work. In Alwar there were numerous furnaces. In the Panjab there were large iron and steel works in several places.

Zinc.—In Rajputana at Jawar in the Udaipur State, it was largely worked and so was *Tin* in the Hazaribag district in Bengal—some 40 furnaces at the village of Naranga alone.

Corundum (including ruby, amethysts, sapphire, topaz).—It was extensively mined in the Bellary district, in the Hindapur Taluka in Madras and in the Native State of Rewah where the supplies are said to be simply inexhaustible. Here the diggers had even to use light in underground operations.

Emeralds—were mined at Ajmere; beryls in Madras; garnets in the Aravalli schists in the Kishengad State, where the outcrop was quarried for over a mile.

Glass.—India abounds in materials suited for the manufacture of glass, and beads and bangles, bottles and fancy articles were made at many places. At Kapadvanj in the

Khaira district in Bombay, much good glass-work was turned out.

Mica.—It was mined in the Hazaribag district in Bengal and in the Gaya district in Behar, where at the village of Rajowli, mines were worked yielding 400 maunds of Mica (23,000,000 plates).

Alum.—It was largely made from Alum shales in the Shahabad district in Behar, at Khetri and Singhana in Rajputana, and in Cutch and Sind. In Cutch, before 1818, the export of alum amounted in some years to several hundred thousand maunds.

These brief notes will, it is hoped, suffice to mark the character and extent of the industry that once was ours in the days that are gone. It is no fancy-picture painted by some patriot's fond imagination but a faithful portrayal based on authentic records. And so was India, not a fancied or fabled India, but the India of fact and reality, the land *par excellence* in the Old World of mines and minerals, of diamonds and gold, silver and copper, iron and zinc, affording varied and honourable employment to numerous classes of her gifted and toiling people who were not then, as now, for the most part passed through the Procrustean process and reduced to the tiller of the soil, putting the seed into the ground and praying to the God of the Skies for rain for their crops.

And be it added, to the honour of our old miners, that a position of such strength was maintained in this important department of national industry in the face of heavy odds. The period was one of unrest and commotion, of change and strife, and the land had no peace and settled Government. And it was due mainly to the energy of our workers that the industry, which might have possibly perished in the general crash, was preserved in the condition in which we find it.

Even so the position of the industry was anything but secure. Analysed, the strong and weak points might be thus stated :—The strong points were chiefly these :—

- (a) The hereditary skill of the workers, as shown in their mining operations, quartz-crushing and

shaft-sinking with adits, &c., and in their metallurgical processes, amalgamation, steel making, &c.

- (b) Their accurate knowledge of the mineral deposits, of the tracts where they worked, the position, direction, thickness, dip and strike of the veins and lodes, a knowledge evidently acquired by years of patient search and prospecting.
- (c) The force of habit and conservative tradition which led them to hold out under great discouragement.
- (d) And their patient perseverance and energy.
- (e) An assured market for their productions, there being no such competition from outside as now.

As *per contra*, the weak points were many and serious, these *inter alia* :—

- (a) The industry was relegated for the most part to the lower classes, e. g., aboriginal tribes in Chutia Nagpur and Bundelkhand, the Kols and Gonds who did most of the diamond-digging ; the upper ranks, men of capital, intelligence and enterprise, holding aloof.
- (b) The workers were mostly poor people, who worked on borrowed capital, and the money-lender dictated his own terms. And they had to be content with scanty earning, sometimes not more than a bare subsistence.
- (c) They worked individually, each on his own account. There was no co-operative effort in any form or shape. They had their castes no doubt ; but they gave them only moral support, and were much like the Regulated Companies in England.
- (d) They had no education whatever. They had only to trust to their intuitive perception, their traditional knowledge and inherited skill. They had not the aid of science. And geology was in India a science practically unknown. And their operations could not extend to any great depth, e. g., in the gold diggings in Mysore.

- (e) They had no requisite machinery and appliances, say, for drawing or dredging, for boring or driving levels, for lighting or winding. In the case of copper mines, for instance, the access of water proved fatal to extended working. Quartz-crushing was always very hard work on the gold-fields.
- (f) Their methods were primitive and involved waste. In Orissa, for instance, in many workings the slag often contained 30 to 40 per cent. of the metal. So, again, they used only charcoal. The needful supply of fuel, however, was not always available.
- (g) These miners and metal workers had no aid whatever from the State. The rulers in those by gone days had other ambitions and other ideals than to help their subjects in their industrial pursuits.
- (h) On the contrary, the taxes and the royalties they levied were sometimes too heavy a burden on the industry. And even the conditions of the mining leases were hard. In the Bellary district, for instance, in regard to diamonds these were—(1) all diamonds weighing one pagoda and upwards to be the property of Government, (2) on others a royalty of $\frac{1}{2}$ per cent, (3) a heavy monthly nuzzur, besides. At Sambhal-pore, the miners had to surrender the diamonds they found to Government, contenting themselves with the gold they could wash out of the gravel.

On the whole, putting the strong and weak points together, it is clear that the position of the industry was radically one of weakness. It lacked organisation, rested on a shaky basis and without the necessary resources of capital and proper direction. There was no attempt at improvement; and in the then state of things none was possible. Evidently an industry so circumstanced could only stand as long as, but no longer than, the general conditions of the world's competition permitted it to stand. And we held our own only so

long as things were not much better elsewhere. The century (1756-1857), however, which witnessed the final passing of India under British rule, was in Europe and America a century of unparalleled growth and progress. The old order of things gave place to the new ; science advanced, commerce expanded, and the arts improved ; and economic developments followed in these countries of a character and a magnitude which had no precedent in the annals of the world. The mining and metal industry shared in this general movement of progress. Geology was extensively studied, particularly economic mineralogy ; and with the aid of applied science in other directions, the whole art of mining and metallurgy was revolutionized ; and vast improvements were effected in methods, processes and machinery ; and the industry was elevated to a plane of efficiency never reached before. In India, on the other hand, we stood where we were--moving and working in the old ruts.

But a change soon came. With the British occupation India's isolation came to an end ; and we were placed in close commercial intercourse with the nations of Europe and America. And with the policy of the open door, and with no protection whatever, we found ourselves to our utter consternation face to face with an industrial competition with which even on our own ground we were powerless to cope. It was indeed a heavy shock, a crushing impact, to our old industries ; and now half a century and more of such violent collision, such unequal conflict, has had its natural effect. Our industries are all but extinct and our market is flooded with foreign imports. The indigenous worker is elbowed out of the field ; and the foreign trader enjoys the easy monopoly.

In no branch of national industry is the collapse of our native enterprise more complete than in this mining and metal work. It is an awful and total ship-wreck. Only here and there a broken spar is to be met with. Some iron smelting in the remote villages, some brass, copper and bell-metal work in the towns ; the making of glass-beads and bangles here and there, this is still ours. So,

again, we mine some mica in Nellore and make and refine saltpetre in Behar. This is about all that is left to us of this old extensive industry. Most of the important branches are simply crushed out of existence. Diamond digging is gone, iron work and steel-making exist no more; copper mining has completely ceased; lead is little worked; and even gold-washing, which at one time was an important industry supporting thousands of poor people, is dead. In Assam where there were 20,000 persons so engaged, there are now just—3, and in all India—1,300. A few figures from the Census and Trade Returns will make the situation clearer.

Number of persons employed in this industry, including workers and their dependants :—

(a) Gold washers	...	...	1,301
Jade and Diamond miners	...	...	1,271
		—	2,572
(b) Brass, Copper, and Bell-metal			
workers	...	...	2,61,622
Tin, Zinc and Lead...	...	...	60,742
Workers in iron and hardware	...	13,35,256	
		—	16,57,620
(c) Knife and Tool makers	...	...	7,183
Agricultural implement makers	...	2,16,931	
Glass makers	...	...	78,152
		—	3,66,266
(d) Workers in gold, silver and precious stones	...	...	15,72,249

(a), (b), (c), (d), 35,38,707, i.e., 11·2 per cent. of the whole population.

Thus, we have at present $3\frac{1}{2}$ million persons still in this line of occupation. Leaving out, the comparatively large class of goldsmiths whose work is rather more ornamental than useful, there are just 2 millions and no more in the field, i.e., 1·7 per cent. of the total population of the country; and this in respect of an industry one of the most flourishing and extensive! Practically, the whole old mining population is forced out, compelled to quit the mines—it does

not know how to work under modern conditions and seek a living, elsewhere! What an industrial exodus before the irresistible advance of the foreign exploitor who with his superior organisation and resources leaves the Indian worker but little hope or chance !

And while, thus, our mining and metal work has perished, our market has passed almost completely, under the control of the foreign trader, and the indigenous supply, except at the village fairs, is now almost at the vanishing point. The imports, inclusive of gold and silver, were in value last year nearly 55 crores. The principal figures are :—(1904—05)

		Lakhs of	Crores of
		Rs.	Rs.
Arms, ammunition, military stores	...	120·3	
Chemicals	...	69·9	
Coal, coke, fuel	...	49·3	
Hard-ware and cutlery	...	268·5	
Machinery and mill work	...	437·2	
Metals	...	993·2	
Railway plant and stock	...	560·7	
Salt	...	71·2	
Mineral oils	...	327·9	
Glass and glass-ware	...	112·5	
Jewellery	...	105·1	
Earthenware and porcelain	...	29·2	
Building and engineering materials	...	35·3	
Stone and marble	..	2·7	
<hr/>		<hr/>	
Total	...	31·82	
Gold and silver (net imports)	...	23·08	
<hr/>		<hr/>	
Grand Total	...	54·90	

The figures speak for themselves. A yearly foreign import of about 55 crores of rupees, in respect of mining and metal work alone, while our plentiful mineral deposits lie unworked and unutilized. What a field of varied and fruitful industry is here voluntarily surrendered to the foreign

worker instead of providing these things ourselves for our own use, not to mention exports to foreign countries : we are content to get them from others, leaving them the work, the profits of such work, and all its higher benefits and let our miners shift for themselves as best they can starve and suffer for want of employment. An old and proud nation uncomplainingly resigning itself to such a condition of things—no severer penalty can be conceived of ignorance and the moral incapacity and helplessness it induces.

Thus whether we take the census or trade figures and test the position from the point of view of population or foreign supply, we see only too clearly what a total and extensive collapse is here in regard to our mining and metal work. The field lies almost deserted and has the dismal look of an abandoned Australian digging. Our minerals are still there ; our mines are there—of diamonds and gold, of copper and iron—the hidden wealth lies underground. Only we, the heirs to the treasure, are forced to quit the arena where we do not know how to hold our own, and our miners compelled to betake themselves to the plough—or worse—and earn a precarious living !

Such a collapse—and of an important and extensive industry—is a fact of our present position of serious import. To the nation it means the atrophy of a fine side of its economic life—a dismemberment of its co-ordered and balanced system of industrial work, a fruitful source of wealth abandoned and a splendid field of employment surrendered to the foreign worker ; to the working population, it means the loss of an extensive industry which once afforded varied occupation to numerous classes ; and to the miners the loss of their hereditary employment and a compulsory resort to an agricultural life and with the grim spectre of famine staring them in the face !

There is no more feature of the present position which deserves notice. We have in several parts of the country a number of mining and metal works started and run mainly under foreign auspices on modern lines. The aggregate work—though the out-come of a series of efforts extending

over 80 years and upwards, is small—limited in scope and range and meagre in its practical results. It is, moreover, a new form of industrial activity with which we, the people of the land, are but little associated and is of help to us only as indicating an important line of endeavour in the new direction. Taking the latest official report on Mineral Productions in India (1898-1903), we find, the total value of minerals produced in 1903 was £4,988,527 or 7½ crores approximately.

The minerals are as per margin (000s omitted). Of these, salt is a Government monopoly. Saltpetre was once

	£
Gold ...	2,302
Coal ...	1,299
Salt ...	368
Saltpetre	288
Petroleum	354
Rubies...	98
Mica ...	86
Manganese ore	132
Jade stone	47
Iron ore...	14
Graphite	16
Tin, Amber, Magnetite ..	10
Total value ...	4,988,527
Rupees 7½ crores.	<hr/>

a Government monopoly under the East India Company's rule, then transferred to European firms, and now, when the trade has largely fallen off, is again in Indian hands. Mica is in the hands of the native workers who hold their leases at a fixed royalty of Rs. 50 per acre. Part of the coal production belongs to native mine owners and associations. The rest of the mineral production of the year represents the results of European enterprise and capital.

Leaving out of account salt and saltpetre, we have an annual output of say 6½ crores rupees—surely an insignificant item in the industrial balance-sheet of the nation. But they are all successful enterprises conducted on modern methods and in the case of gold and rubies yielding large dividends. They are useful to the nation as affording for its guidance a remarkable object lesson in industrial exploitation on the new lines. They are, however, too small to affect or alter the general position. The average number of persons employed in these mines is about 102,000—and, work and wages for so many workers. This is all our direct material gain.

Such in brief outline is the present state of things. The picture is rather a shaded cheerless picture—the picture of

a vanished industry once so prosperous—of numerous sections of the population once living in such comfort by it, forced to quit their ancestral calling, and thrown on the land, to shift as best they may, of no beginnings yet to be noticed, nor even a sign of any serious endeavour to rescue them from their fate ! The few new enterprises in the country serving no such purpose, the nation looking on with apparent unconcern, no outlook could be less hopeful ! Now, however, there is a turning of the tide. With the new national awakening as symbolised in the *Swadeshi* movement there comes a glorious opening, a new prospect bursting on the view, bright with hope and promise. Things which only a short while ago seemed all but impossible and chimerical, are now well within the range of possible attainment. And there is every reason to hope that we may not have any very long to wait before some vigorous action is taken to grapple with this branch of the general industrial problem.

Such an endeavour under the existing circumstances is a duty—a national duty—which we ought not to put aside. Every economic consideration emphasizes the necessity of such remedial and ameliorative action. There is first the economic evil of a general dependence on agriculture as the one sheet-anchor of industrial life ; there is next the condition of the people question—the grinding poverty in which a vast mass of the population is under the existing conditions of economic life in the country, condemned to live, imperatively demanding the opening out of diverse lines of non-agricultural employment to relieve the pressure ; there is again the problem of a general re-construction of our national industrial system, of which this mining and metal industry forms such an important and integral part. There is also this further aspect of the matter. As things are, there are whole tracts in India where agriculture cannot well prosper—neither the soil and climate nor the water supply conditions being favourable for it—but which are highly mineralized tracts such as Karnul and Cudapah in the Madras Presidency ; and it is simply distressing to find that no effort is made to work such tracts along the lines of

development their varying resources suggest. Just as different classes of people require different lines of employment suited to their aptitudes, so, too, different tracts of country—industrially speaking—need different treatment according to their capabilities ; and it is a grievous economic mistake to turn a whole country of varied physical features and diverse resources into a sheep-run or a cattle-farm as it is to turn a whole population of varied constituent elements on the land ; the Procrustean process is as ruinous in the one case as in the other, and does incalculable harm to the general style and tone of economic life. Karnul, for instance, in the Madras Presidency, is one of our richest Zillas with its diamond deposits and copper ores, and was at one time one of the most flourishing centres of such mining industries in Southern India. There are a number of localities in the district where numerous traces are still to be seen of rock workings and alluvial washings for diamonds as well as of extensive copper mining operations. Now, however, there is neither copper mining nor diamond digging here and the tillage of the land is the only occupation of the people. The consequence is—the district is a poor agricultural district—ever in the grip of famine and with a starving struggling agricultural population. The same is the case with Cudapah, another Madras district, which is even worse off. To be sure, under normal conditions of varied economic development, these zillas in Southern India ought to be among the foremost mining districts in the land. Similar remarks apply to various other parts of the country.

The need for a comprehensive endeavour to initiate such varied development of the country's resources is thus obvious, and will meet with general recognition ; and the revival of our old mining and metal work is suggested as one important step in the new direction.

We will now proceed to submit a few observations indicating in a general way the lines on which such revival of this mining and metal industry may be initiated. And the first question in this connection for consideration is the question of agency. What is the best and fittest agency for

purposes of such work ? The state, foreign enterprise, or we the people of the land, or all these together ?

In this matter, the Government of India does not follow the *doctrinaire* principle of *laissez faire*. It holds and rightly that as a policy, whatever its adaptability elsewhere, it is altogether unsuited to the circumstances of the country. A protective tariff is of course out of the question : and the State has not even any large works of its own—if we except the Warora Collieries—and carefully abstains from starting any—where, as for instance, in iron and steel, it might most appropriately do so. There is the sanction of precedent as well as of abstract theory for such direct intervention on the part of the State in matters industrial, and there is further ample warrant for such in the economic conditions that prevail in India. But Government does not think fit to go so far and embark upon such a course of direct action. And its consistent policy during the whole of the past century has been to look up to private enterprise to do the work and confine its own efforts to aiding, encouraging, and stimulating it in every legitimate way by the grant of liberal concessions, subsidies and advances, &c., &c. The principle of State help and State guidance in pioneer work in the line is fully recognised ; and the general attitude of the State in India in respect of such undertakings leaves little to be desired.

As for ourselves, however, it is obvious, we have hitherto done little to avail ourselves of our opportunities in the matter. We have our Saltpetre refineries in Behar and Mica mines in Nellore ; and we have a considerable share in coal production in Bengal. But such straggling efforts apart, our association with the new enterprises is almost *nil*. Whatever the causes of such aloofness on our part, the fact is there as stated and has to be frankly admitted.

And thus, so far, English enterprise is there and holds the field. It has been doing its work in the line ever since 1820 when the first coal mine in Bengal was opened, and the first attempt made to work iron ores on the modern methods. And during the whole of the time it has had the most active support of the Government of India. As far

as this development of industry is concerned, the net result of its labours extending over 80 years and more is on the whole meagre and just touches the fringe and no more. Coal and gold, petroleum and manganese ore, gems and mica, jade stone and graphite are about all the minerals yet tapped. There are some 74 registered mining and quarrying British Companies including coal, gold, mica, &c., with a nominal capital of 3 to 6 crores of rupees. The total number of mines in 1903 was (including both European and Indian) 646, the average number of persons employed being 102,195, and the total value of minerals produced was, as already stated before, £4,998,527 or leaving out salt and saltpetre £4,367,893. This represents the total net outcome of 83 years' effort on the part of English enterprise, enjoying the cordial support of the State to develop our mineral resources. This cannot be regarded as satisfactory or in any way encouraging. But we have no right to complain. The work that has been done, deserves acknowledgment; and it is only fair to recognise that there are obvious limitations to the extension and usefulness of such undertakings engineered by foreign enterprise. The field of effort is ours, and we have no right to expect the foreign exploiter—whatever the energy he may bring to his task—to do everything for us without our aid or co-operation in any form or degree. There are further certain considerations in regard to this point which we have to bear in mind.

1st.—English industrial enterprise is justly famed throughout the world for its unrivalled energy and its splendid achievements. It has claims coming upon it from all quarters of the globe, and its help is sought in developing so many virgin fields and pastures new. Australia and South Africa, Tasmania and New Zealand, Canada and the West Indies with their immense possibilities—these and the others within the ring-fence of the empire, and Egypt and China, and the rising countries of South America outside—with such and so many superior competing fields for exploitation, India evidently can expect to have but a limited chance. The activity of English enterprise will naturally follow the

broader lines ; and the chances of its taking up the work of industrial revival and development in an old country like India will be at the best remote, and this to our thinking accounts for the slow and meagre advance yet achieved in India. Take Tasmania—a poor Australian Colony—with but little hope up till 1850 when coal was first discovered ; and gold two years later. The work of systematic geological exploration was commenced in 1860, and after an exhaustive survey of the mineral deposits of the island colony, English enterprise took up the work ; and in 30 years' time Tasmania has become one of the foremost mining colonies in the Commonwealth taking the lead in Copper production. The progress of Victoria, another Australian colony—since the discovery of gold in 1851—has been under the auspices of the same agency simply magnificent ; and the Colony is now one of the richest in the Empire with a total gold production of 266 million pounds sterling. In India such work commenced in 1820 ; and after 85 years the mineral production is not yet over 5 millions in value. The contrast well illustrates the point.

2ndly.—It is worth noting that when even so we get our chance, and English enterprise comes to your help, it comes to our help only in respect of the most promising lines of development. It does not take up—and why should it?—any inferior or less attractive fields. Its operations as yet extend only to a limited range ; but even within the limits of that range it is to be noticed that they are confined for the most part to some of our richest tracts. Whether we take coal or gold, petroleum or gems, we find that the work of the British Companies does not go much further. Coal for instance is a well paying mineral, but coal mining is yet limited to the Gondwana fields, whereas at Raniganj and Jherria the richest seams occur. These two coal fields produce between them over 70 per cent. of our total coal production of the year. So, again in the case of *gold* the mining is practically restricted to the Kolar mines in Mysore which are about the richest in India. Eight companies are here working with a total capital of less than two millions sterling (1·8). The total value of the metal extracted from

1882 to 1903 being 18·6 millions sterling—ten times the original investment and over 8 millions sterling paid as dividends—more than four times the capital. Similarly, Petroleum is worked in Bur ma under almost "ideal" conditions on the well-known Yenang-yaung oil field in the Kodaung tract. As to Rubies, the Ruby Mines Company is in a position to pay about 18 per cent. dividends. But we have not got such splendid tracts all over the country, and there are numerous areas where these and other minerals occur, but where the conditions of development are not so attractive ; and they yet lie almost untouched. The gold deposits, for instance, of the Wynad, of Chutia Nagpur and of Assam are unworked, and the Government specialist reporting on them only recommends further prospecting and trial borings. As to iron ores they still lie undeveloped, and with all the repeated attempts on the part of Government to get iron and steel works established, and an important industry developed ever since 1820, there is as yet only one British Company in the field—the Barrakur Iron and Steel Company.

3rdly.—Manifestly, such efforts on the part of English enterprise and such help rendered in respect of our industrial revival, whatever their value *per se*, can never suffice for our requirements. Ours is an old country where the lines of work and new developments lie on varied planes of prospective benefit and success, and where what is most needed is an even all-round advance. Here the work to be effected has to be steady, persistent, and all over the field. Foreign enterprise will be easily persuaded to take up the working of the Kolar mines or the Yenang-yaung oil-field ; but the development of tracts less favourably conditioned like Assam, or the Wynnaad, must be our own work ; and no foreign exploiter will assist us here.

4thly.—Further, under such a division of work as between indigenous and foreign enterprise, the inequality of the conditions effort is only too apparent. Indigenous enterprise is placed at a serious disadvantage when the foreign exploiter is permitted to get hold of the richest tracts and it is only the less favoured that fall to the share of the native

worker the arrangement certainly involves a grave injustice, and is eventually likely to retard rather than promote the country's advance. The indigenous worker so handicapped may not be able to take up the less promising fields which in such a case must remain undeveloped. At all events such a state of things is a great discouragement to native industrial enterprise which is yet so feeble and just taking shape and which requires for its growth all the nursing and stimulous it could receive.

5thly.—There is, also, besides this consideration which applies with peculiar force to mining industry :—As in the case of pearl and other fisheries, so in this, the supply of the raw material is a natural supply existing independently of human intervention. Further, it is a supply incapable of augmentation or replenishment by human effort. It is a *limited* treasure, hidden underground, and is in the nature of God's gift to the country where it lies, and belongs of right to the people of that country and to no one else. No doubt, in India, technically and in law the State owns the minerals as it owns the forests, except in permanently settled tracts ; but such ownership can never be absolute. It is a trust held on behalf of the people and to be administered for their benefit. And in this view of the matter, it would appear that the mines should be in the hands of the people whose property they are, and to be worked by them and ought not on any account to be suffered to pass into the hands of outsiders. And when—and as long as—the people are not for any reason in a position to so take them over, they should be held by the Crown in trust and worked as Crown mines for them. In some of the Native States the most valuable of the mines were held as the Raja's property and managed as such.

Looking at the matter from this point of view, it would seem that the working of our mines as things are is the weakest part of the existing system. Most of these mines are leased to foreign companies. They hold and work them ; we the people of the country get only a small royalty for the State and wages at the rate of 4 annas a day for the

labour employed. We have absolutely no further share in their working or management. The business experience and the invaluable training all go to the foreign Syndicates. Besides as the mines are worked, and to the extent they are worked, they are exhausted and such exhaustion is a permanent loss to the country which can never be recouped. An exhausted coal-mine or a worked-out petroleum field is an irreparable loss. Take again the ruby mines in Burma: the supply of gems is not an inexhaustible supply, and when it comes to an end, part of the nation's hidden treasure is gone, and absolutely, never to be replenished, foreign enterprise is the only gainer. Nor, again, does the existing system bring us any moral advantage. The business is all administrated by outsiders in all its main departments. We are not associated with any, and the exclusive arrangement which shuts us out from all participation in the higher advantages of business discipline fails naturally to promote amongst us a spirit of enterprise. 328 prospecting licenses were issued during the years 1888-1903, 129 in Burma, 82 in the Madras Presidency, 64 in the Central Provinces, and the rest elsewhere. Of these, 64 were for search for gold; 48 for petroleum, 36 for manganese ore, 26 for graphite and plumbago, &c. But excepting Mr. Tata's in the Central Provinces, we doubt if half a dozen of these 328 prospecting licenses are held by Indians. They are for the most part in the hands of the foreign exploiters. Such is the cramping paralysing effect of the existing system of exclusive foreign exploitation on indigenous enterprise in this matter of mining.

Nothing economically speaking could be less satisfactory. In the case of this mining industry, the development of the country's resources has a meaning and a reality, when the minerals mined out go to the people and are added to their standing working reserve of wealth, and when further, such development has the effect of encouraging and stimulating their enterprise in the process. But when neither is the case, it is no economic development proper, but one of the worst forms of exploitation conceivable. And under such

circumstances, every ounce of gold, every ton of coal, every gallon of mineral oil, every gem mined out which leaves the country is a dead loss and without an equivalent. In commenting upon Lord Curzon's great speech at the Calcutta Chamber of Commerce dinner (February 18, 1903) over two years ago, the *Statesman* puts this point with great clearness, thus :—

"In the case of the mining industry, for instance, it (*i.e.*, the development of the country's resources by English Capital) means not merely that the children of the soil must be content for the time being with the hired labourer's share of the wealth extracted, but that the exportation of the remainder involves a loss which can never be repaired. Though the blame largely rests with them, we can well understand the jealousy with which the people of the country regard the exhaustion, mainly for the benefit of the foreign capitalist, of wealth which can never, as in the case of agriculture, be reproduced. It is, in short, no mere foolish delusion, but an unquestionable economic truth, that every ounce of gold that leaves the country, so far as it is represented by no economic return, and a large percentage of the gold extracted by foreign capital is represented by no such return, implies permanent loss."

So, again, recurring to the subject a few days later, it writes (March 5th, 1903) :—

"As we said in a previous article, the exploitation of the mineral resources of the country by the foreign capitalist stands on a different footing; for in this case the wealth extracted is not reproduced, and, on the not unreasonable assumption that it would sooner or later have been exploited with Indian capitalist may unquestionably be said to deprive the people of the country, for all time, of a corresponding opportunity of profit. Even in this case, however, it must not be supposed that the people of the country reap no benefit whatever from the exploitation. They lose a valuable asset, in the shape of potential profit on capital, it is true; but they receive a greater or smaller quota of the value of the mineral wealth extracted, in other forms such as wages

and royalties. In some cases, no doubt, wages and royalties combined are small compared with the profits of the capitalist ; but these are the exception rather than the rule."

In both Japan and China under the new awakening, this undesirable side of foreign industrial exploitation in this matter of mining industry is well borne in mind, and the laws provide statutory safeguards and limitations in favour of the national interest. In Japan "prior to 1900, Japanese subjects only were allowed to undertake mining industry or become the partners or shareholders of a mining Company ; but according to the amendment introduced in the same year, any Japanese subject or any Company organised in accordance with the Japanese Commercial Code may undertake mining industry in Japan, so that foreigners may now take part in the mining industry in Japan as partners or shareholders of a mining Company." (Financial and Economical Annual of Japan, No. III, issued by the Department of Finance, Tokio, 1903, p. 48.) Similarly in China "The control of mining operations is now in the hands of the Board of Commerce which has made new regulations respecting the Constitution of Mining and other Companies. Of the capital of any Chinese Company not more than 50 per cent. may be foreign and every foreign Company must reserve at least 30 per cent. of its share capital to be taken up by Chinese" (Vide *Statesman's Year Book*, 1905, p. 529).

The reasonableness of such statutory restrictions is beyond dispute, and we wish we had some such in India. But here alike in the British Provinces and in the Native States this higher economic point of view is more or less put aside, and our mines are freely made over on lease to foreign Syndicates for exploitation. Our very rights of property in them are denied, and they are treated as though they were the mines in "No-Man's-Land." Viewing the matter from the stand-point of Cosmopolitan progress, Lord Curzon in his Calcutta speech above referred to observed in this connection :—"The whole industrial and mercantile world is one great field for the tiller to till ; and if the man who lives on the spot will not cultivate it with his own spade, then he has

no right to blame the outsider who enters it with his plough." All the same, however, it is permissible to hold the view that it would have been better for us and the country if instead of calling in the aid of foreign Syndicates in the matter, the State in India had thought fit to own and work these mines itself as it owns and works the Railways and the Warora Coal mines. Similarly referring to the agreement recently arrived at with the concurrence of the Government of India between the Mysore Durbar and the Kolar Gold Mining Companies for an extension of their existing leases when they severally terminate for 30 years on condition of the payment of royalty as at present, viz., 5 per cent. on the gross out-put and $2\frac{1}{2}$ per cent. on dividends as and when declared, it would seem that the Durbar would have done better if it had decided to take over these mines itself on the determination of the existing concessions and made them over for working to some Mysorean Syndicate, or failing such Syndicate, retained them under its own administration, and run them as State concerns. In this connection it is worth noting that while the Mysore Durbar takes only $2\frac{1}{2}$ per cent. as its share of the dividends, the Government of India in their concession to the Ruby Mines Company in Burma claim 30 per cent. of the profits of the concern as the State share. So, again, it is not easy to understand the considerations which have led the Government of the Nizam to grant large mining concessions in the Hyderabad territories to a foreign Syndicate in preference to Messrs. Tata and Company.

Be that as it may we recognise that it is chimera to hope to have in India such restrictions relating to this industry as exist in Japan and China. But we trust and hope that in view of some of the considerations referred to in previous paragraphs, Government cordially desires and is fully prepared to do all that lies in its power to promote indigenous enterprise in this direction. English works started and run in India by English Syndicates on lines suggested by their experience of the freer conditions of industrial life in England do not naturally require any direct aid from the

State. Indian Indigenous enterprise, however, is just in its first stages of growth and is entitled to a larger measure of State support, and we have no doubt that when the Indians enter the field and ask for it, they will get it at the hands of the Government of India.

The main point of the argument is that this mining industry pre-eminently represents a field of effort which belongs to us and to no one else, and that we ourselves should work and develop our mines as best we can with our own exertions, as far as possible, and with such aid from the State in case of need as we may legitimately claim. In this as in other branches of industrial work it is well to bear in mind that there is no instance in history of one nation undertaking and carrying out with success the development of the industrial resources of another by such methods of direct exploitation. In the case of the Colonies and Settlements, the work that there has been in supersession and exclusion of the wild aboriginal populations. And, all things considered, it is clear that self-help is for us the only safe rule of action. The field is vast and varied—only touched on the fringe.

Surely it is unreasonable to expect the outsiders to work it for us: nor—judging from close on a century's experience—does it seem likely that English enterprise would render to us the measure of assistance we need for the purpose, and even supposing that it would, it is open to grave doubt whether we should avail ourselves of such assistance and entrust to other hands the work which it is our national duty as it is our national interest that we should do for ourselves. The hard economic situation in India imperatively demands of us such an effort, and requires that we should put our hands to the plough and till the field which is ours by right of birth. And it would be little short of a dereliction of duty on our part if we should blindly persist in our present strange unconcern and aloofness and passively look on while it was being exploited by foreign agencies.

And now the practical question for us to consider in this connection is, in what way and on what lines we may best

be able to organise work of our own in this department of industry and take up our proper position in respect of its development.

First, then, as to the conditions of the effort required—

(1) At the outset it may be pointed out that with us such an effort is no new effort. Mining has been in the country an important industry for centuries, and the work before us is essentially a work of revival and restoration only on modern methods. Our old miners are still there, though not now actually engaged in the line. They have still their old traditions and, in parts of the country, their hereditary knowledge of their local mineral capabilities, e.g. the gold washers of Chutia Nagpur and the diamond diggers of Cudapah, and their assistance will be of service to us in the new effort.

(2) Even so, we have to remember that this mining industry differs from other industries in certain important respects. The minerals are there as a natural product independently of our effort, but they lie underground, and there is the element of chance which cannot be altogether dissociated from the effort as in the case of fisheries.

(a) Where these minerals occur, such as coal or argenti-ferous shale, in beds and seams which are constituent members of the enclosing series of rocks and of contemporaneous origin with them, the geologist is able to give us in the work of exploration all the aid we need. He can mark out for us the geological zones of their occurrence to which prospecting has to be limited. But in cases in which the minerals are to be found only in veins, lodes, or masses disseminated through various formations, e.g., diamonds or rubies, gold or copper, there is an uncertainty about their occurrence and extent, which science even in its present advanced stage is not able completely to remove. The veins and lodes differ in thickness within very wide limits. Sometimes they may thin

out and even disappear or after a break reappear at lower depths, their lie, their strike, their size all present variations which cannot be calculated beforehand. No doubt in certain cases there are the well known affinities of mineral veins and lodes for particular rocks and geological formations to guide us, e.g. Magnetic oxide or Specular iron ore usually occurring in the granites or copper in slate formations. Still, chance cannot in all cases be altogether eliminated.

- (b) There is further—in the case of both these classes of minerals—the uncertainty of the *find*. Geology and the observation of surface indications and associated minerals and peculiarities of fauna and flora are both of help in the matter. But all the same, prospecting is always more or less in the nature of a speculation.
- (c) There is, again, the peculiar difficulty of work in the mines. The open shafts and pits are comparatively easy to conduct; and our miners are used to it; but labour is distasteful in underground works where mining is done under cover of rock or earth and excavations are carried out of solid minerals under water, e.g., the dredging of gold-bearing gravel from river bottoms or of liquid minerals by wells. Here trained miners are required, and appropriate machinery.

(2) Such are some of the inherent uncertainties of the industry. We have also to look to the nature of the field where our work must lie.

Our mineral resources are rich and varied—though not quite as magnificent as those of the United States or South America. There is not a district in the country excepting perhaps Sind and parts of the barren Deccan which is not found on exploration more or less well mineralised. Even Rajputana has its underground supply of beryl and garnet, lead and limestone, silver and slate, and Rewah has an inexhaustible supply of corundum. But ours is an old country

where there has been mining from time out of mind. As a natural result, the tracts to which the old operations extended show more or less signs of exhaustion. But it is the surface diggings that are so exhausted. The mineral supply lying deeper is perfectly intact. And this applies to diamonds and gold as it does to copper and silver shale. It may be added in this connection that the Mysore Kolar mines are worked on the lines of the old operations—only the metal is sought at greater depths. The law of *diminishing returns* holds good in the case of mining as it does in that of agriculture, and re-working the old mineral tracts must mean a smaller return to capital than in the case of virgin fields. But this is a necessary condition of such industrial work in an old country like India and has to be accepted as such. Even in Australia, and in and around Ballarat itself gold is now sought under a regular system of mining at great depths below the surface ; and so, too, in the United States. This, however, apart, there are extensive deposits in many parts of India—and gold, which will last us for years and years. In regard to diamonds, there are considerable tracts of the diamond-bearing conglomerate in the Cudapah district which are intact, untouched and untried by the old miners. So too in the matter of gold, the metal exists in richly-paying quantities in many of the lodes running through the Dharwar schists, &c., &c.

(3) We must remember, that the work in the new line must be up to the level of the modern standards. Mining is now a scientific art and no longer an empirical industry, and unless the requisite standard of efficiency is reached, we can have no chance whatever under the hard modern conditions of the world's competition. Protection in India under the existing system of Government is beyond the pale of practical politics, and we cannot and ought not to rely upon such shelter even in the first stages of the effort.

(4) So, practically though the work is one of revival, we must begin at the beginning and start as with a complete *tabula rasa*. The old tools and appliances, the old methods of exploration and prospecting, the old empirical processes

of mineral extraction and mineral dressing, &c., all these will have to be discarded. And as the Japanese have had to do under somewhat analogous circumstances, we must employ the most effective modern machinery and mining methods whether for boring and blasting, for draining or dredging, for winding or haulage, &c., and indeed if we mean business, we must call in expert guidance and help in respect of all the different branches of the industry. Nor is this all. We must further have a fresh organization of the whole working agency.

Thus, the inherent uncertainties of the industry which even advancing science cannot altogether eliminate, the apparent surface exhaustion of the mineral tracts to which the old mining operations extended—pointing to the necessity for deeper and consequently more costly diggings—a high level of efficiency in the work under modern condition as a *sine qua non*, and with it the employment of the newest and most effective machinery and methods for such work—these are among the conditions of the new effort to which we are called in this matter of mining and metal work. Agricultural revival cannot be half so difficult, nor even the starting of cotton mills: and it is evident that for an efficient organization and prosecution of the work on the new lines we must have every aid that we can possibly obtain—State-aid, popular aid, the aid of the foreign capitalist, &c. Above all we must have the fundamental resources of enterprise and capital commensurate with our requirements.

As regards *Enterprise*, it may be individual or co-operative. And for our purposes we require it in both its forms. It is true, in the general scheme of modern industrialism, the individual has but a small share as an independent factor. But sometimes he brings to his work an impulse, an amount of moral force, a vigour of initiative and action, and a command of resources which guarantee success. A Junkichi Furakawa or a Tata would do for the country and its industries even more than a dozen Joint-Stock Companies could do. But such men of commanding genius and business capacity are but few, in any country, and fewer in a country

like ourselves, where business is just beginning to be built up on a modern basis, and Joint-Stock co-operation is the one form of enterprise on which we must chiefly rely. It would be worth while to try also village guilds, whereas in several districts of the Madras Presidency (*e.g.* Cudapah, North and South Arcot) the necessary constituent elements exist. The aid of village organisations too would be of value in the various stages of the work. But these would be more or less accessory helps, and the main agency for the effort which could be depended on would-be Joint-Stock Companies. We have a number of such companies in various branches of industry—but few or none in this mining field—if we except the native Coal Mine Associations in Bengal. No advance, however, would be possible in the new line except on the basis of organised co-operative effort.

Next, comes the question of *Capital*. This is one of our greatest wants for purposes of the new industrial start. In these days of vast extensions of industry and commerce, small works and limited investments could have but little chance. Foundries, factories, mining operations, refineries—all have to be on an extensive scale: and costly machinery, tools and plant to be employed. Capital in large amounts is an indispensable aid even for a start and how and where it could be obtained from, is one of the hardest questions we have to consider. Lord Curzon's estimate of our hoarded wealth is 825 crores. It is not known on what bed-rock of facts it rests, but, supposing it is fairly correct, it is evident that much of it is locked up in the State Jewels in our Native States, a considerable part in the people's ornaments and only a small residue at the best is available for our purposes of industrial investment. And even this, in the absence of banking facilities and credit organisations we have at present no means of drawing out mobilising for the people in any tolerable amounts. Possibly, cautious people would advise us to wait till the country should come to possess the necessary capital; but unfortunately, time and tide will not wait for us, and we shall be throwing away opportunities which may not return. Under such circum-

stances, we would suggest a resort to the aid of the foreign capitalist as the only alternative left. We are aware, such a proposal would scarcely meet with general acceptance, and would be viewed with distrust and hostility. Men naturally do not desire to share with others the profits of their work and view with jealousy, foreign aid in such efforts. It has, however, to be remembered that such aid is to be sought only in the last resort and for the first stages of the new industrial endeavour. Interest would be all that we should have to pay on it; and there would be no interference of the foreign capitalist whatever, with our undertakings in their initiation or management. They would be ours entirely and in proprietary right, and under our administration, only run with borrowed capital. Besides, as soon as the first trials are passed, and the concerns are well established, the loans would be repaid, and the aid of foreign capitals would cease. No sacrifice would be entailed and no harm caused, but such aid would enable us to do what must otherwise be left undone, and we are persuaded that a hundred million pounds sterling so borrowed from the foreign capitalists on easy terms, and judiciously laid out, would not only be the means of enabling us to start numerous industrial enterprises on the newer lines, but also of effecting a vast ameliorative change in the economic life of the people so as to send light and hope, comfort and joy, into thousands of cheerless homes in the country in a way of which we could have at present but a dim idea. A similar question has been for some time past exercising the public mind in Japan. A large majority of the Japanese people are opposed to the introduction of foreign capital into the country; but according to Baron E. Shibu Sawa, President of the United Chamber of Commerce, the weight of authority and experience, as represented by Marquis Ito and others, is distinctly on the other side; and Baron Shibu Sawa himself holds the view that "as the capital we have in the country is not enough, foreign capital is needed to open up the resources of the country" (*Vide Japan by the Japanese*).

In this matter, however, of foreign loans, it would in some cases be necessary for us to appeal to Government for special assistance. Foreign capital would not easily come in except under adequate securities ; and it would scarcely be possible for us in all cases to offer such ourselves in our individual capacity and in the first tentative stages of industrial effort. And in such circumstances we should find it indispensable to invoke the aid of the State. The State represents the collective strength of the nation and where its support is necessary for purposes of national advancement, we may be justified in seeking it in matters industrial as in other branches of national life. And we would venture to suggest that we might in such cases of absolute need appeal to Government to allow us to raise the necessary capital in foreign markets under a *State guarantee* on conditions similar to those on which Railway Companies are permitted to borrow for their purposes. The State guarantee has effectually paved the way for the growth of railway enterprise in the country, and so would it be of service in helping other enterprises too into healthy life. This no doubt marks a large departure from *laissez faire*: but the principle of State-aid and State-guidance in such matters is here with us fully recognised and we submit that railway enterprise in no way differs from other forms of industrial activity. And we have no doubt that Government would extend to native enterprise in respect of this mining and metal industry the kind and measure of help it allows to the railway companies. The aim in both cases is the same, namely, the industrial development of the country.

But this is not the only direction in which we should need the aid of the State in these efforts. We should further require such assistance in respect of the existing rules regarding prospecting and mining leases, mineral exploration, mining education, &c.

As regards prospecting and mining leases in view of the peculiar uncertainties and difficulties of this branch of industrial enterprise, short leases and limited areas would

hardly suffice for the first stages of the effort and we would earnestly solicit on behalf of Indian mining efforts more liberal rules extending both the terms of leases and the areas for prospecting and mining. So, again, as to royalties and rents, we would ask that they might not be levied until a certain minimum limit of profit on the investment is reached. Lastly, as to prospecting work, this work of trial search is always more or less speculative and there is ever present the risk of failure. So it would be a valuable aid to private enterprise if Government would themselves carry it out at their own cost and by their own special staff of officers, at least in all important cases. Where, however, they should decide not to undertake any such operations themselves, they might help private efforts with grants of money in aid of such work.

Next as regards Mineral Exploration ; a good deal of valuable work has already been done ; and the labours of a long line of distinguished Geologists, including Drs. Oldham, Blandford, Medlicott, King, Foote, and Ball, deserve our grateful acknowledgment. A vast deal more work however, still remains to be accomplished. Mineral investigation seems to have been hitherto confined mainly to the Eastern parts of the Peninsula, particularly the Gondwana area. And whole tracts outside the range lie particularly unexplored. The Bombay Presidency is left out in the cold under the supposition that it has but few minerals of economic value. And yet, we have our laterites in the Deccan in which Magnesite occurs to the extent of 15 to 20 per cent. They are of the same geological formation as the Bundelkhand and Amarkantak laterites ; and it has been recently ascertained that several of these laterite-deposits contain large quantities of aluminium and are almost identical with bauxite. In the Dharwar schists we have gold bearing bands of quartz reefs ; in Godhra in the Panch Mahals in Gujarat, we have plenty of iron-ore and some coal too. With all this, however, there has been no systematic mineral investigation of the Presidency. Similarly our Native States are for the most part geologically speaking a *terra incognita*.

And yet many of them abound in useful minerals—such as the Nizam's dominions, Mysore, Cutch, Kattyawar, &c.

This work of mineral investigation is at present carried out by the Geological Survey of India. The operations of the Department embrace partly *economic inquiries* and partly *geological surveys*. And for the former purpose special officers have been of late years temporarily engaged from England for the purpose of reporting on the coal, gold and other mineral resources of the country. When things are so arranged, it is the scientific part of the work that receives the special attention of the Department while investigation is relegated to temporarily engaged outsiders. The arrangement is altogether unsatisfactory: and we are strongly of opinion that the temporary employment of such men should cease, and that there should be a special staff of experts under the Director of the Survey, charged with the duty of economic inquiry and that this work of such special importance should be conducted in a more systematic, comprehensive and thorough manner. The temporary men have often too large areas given to them and their labours often yield no results of any permanent practical value. Major Maclareen, for instance, in his recent Report on the auriferous occurrences of Chutia Nagpur admits that his conclusions "are the results of a single season's work over a very wide area" and are therefore naturally "liable to modification on the production of fresh data derived from a closer investigation." There is evidently waste in such inquiries, and we would press for a better organisation of the work.

Further, we would suggest that the results of such economic inquiries should be rendered available to the people through Vernacular translations of Survey Reports. Such Vernacular literature would be of great service in disseminating amongst the people a knowledge of these matters, awakening inquiry, and assisting in a material way the projection of mining undertakings.

Lastly we come to *Mining Education*. Here it is satisfactory to find that the Government of India fully recognises in view of the growing importance of the mining industry in

the country, the necessity of providing adequate facilities for mining instruction. It has recently sanctioned the opening of a mining class at the Seebpoor Engineering College under a Professor of Mining Engineering and also a number of foreign technical scholarships to enable students to study the subject in England and elsewhere. Already there are four Bengalee students studying mining in Birmingham. This is on the whole a fair start. We are not, however, we confess, in favour of such special classes for new and independent studies joined on to old educational institutions. They run the risk of being shadowed over and relegated to a subordinate position as was the case with the agricultural classes in the College of Science, Poona ; and we should have wished for an independent, well-equipped, well-staffed College of mines located in some central position in the mining area. But this is for the future. We are just now only at the threshold, and we think it would be premature to make any large demand upon Government in the matter at this stage. Meanwhile, however, we would suggest that Geology with special reference to economic Mineralogy might be advantageously introduced into the curricula of the schools and colleges as part of general education, as is done in the countries of Europe and America.

Under some such scheme and with the aid of the State in some such forms, we think, the work of reviving our old mining and metal industry may be attempted with a fair prospect of success. And such revival of the industry would be a boon and a blessing to the country. It would resuscitate an ancient industry and restore to the old mining population of the land their fruitful, congenial hereditary calling which would lift them beyond the grasp of famine ; open up a large field of varied employment for our working classes ; would tap a new source of national wealth and create a new field of investment for our capitalists, prove an important step taken for a reconstruction of our national industrial system on modern lines and would further furnish a means by which it would be possible to restore to large tracts in the

country (*e.g.* Karnul and Cudapah in the Madras Presidency) the prosperity which once was theirs.

And as a beginning on the new lines, we would venture to suggest the following among other works as affording fair chances of success :—

1. *Aluminium industry* in Madras—now an established industry, and several British Companies are already engaged in it.

2. *Manganese ores*.—The mining might be started in Dharwar or Belgaum where the deposits are rich and plentiful. The industry has a bright future before it.

3. *Copper-mining* at Jabulpore in the Central Provinces where rich deposits of the metal occur.

4. *Iron and steel works* at Salem where the richest deposits exist. Absence of coal is a drawback. In France there is a similar difficulty, iron and coal not occurring together. The question, however, reduces itself to one of transport and can be easily settled.

5. *Granite works* in Madras where granite occurs capable of high polish.

6. *Glass works*, at Aligarh, in the United Provinces of Agra and Oudh. There is in the Provinces already an extensive manufacture of glass by native methods ; it might be re-organised on European lines. So, again, they may be started at Kapadvanj in Kaira zilla in the Bombay Presidency.

7. *Gypsum*, a most valuable manure and otherwise a useful mineral, in Satara or Phalton where the supply is large.

8. *Lead-mining*, in Karnul, in the Madras Presidency where the ores occur in considerable quantities.

9. *Gold-mining*, in Dharwar. The schists there are rich, and only recently 3 British Companies have been formed with a capital of £160,000. Here the industry is most promising and the field is large. In the opinion of experts, the operations at present going on tap, but to a small extent the gold bearing rocks, the extensive bands of schists.

10. *Diamond-mining*, at Panna, in Bundelkhand and in Cudapah in the Madras Presidency where we have long stretches of promising diamond Conglomerate beds.

11. *Galvanised iron and tin plates*, in Bombay. The import is a large import, nearly 160 lakhs in 1904-1905. The manufacture is a simple process only a supply is needed of iron, zinc and tin.

12. *Gold-washing* in Assam. Government should be appealed to restore to the poorer classes in Assam this their ancestral craft which they have been for 35 years past prohibited from following, most unjustly, with a view to ensure gold concentration in the river beds, and in the interest of foreign exploitation.

A few such works would suffice for a start ; and it may be remarked in a general way that *diamonds* and *gold*, *copper* and *lead* and *iron* are among the most promising of our minerals, and that it is a duty we owe not only to ourselves, but also to our children and children's children that we should ourselves endeavour to work them and not suffer the foreign exploiters by our apathy and inaction to secure a monopoly of the working. We would go a step further and advise that the main effort may for the present be concentrated on these minerals as far as our means may permit.

The whole work is new ; the subject is but little studied or understood in the country ; and in view of the urgency of the circumstances and the practical importance of the endeavour, we would earnestly recommend the creation, as a necessary part of the practical scheme, of a strong organisation for the purpose—a central association with a net-work of branches all over the country, practically in the mining tracts—to work out in a practical way this problem of the development of our mineral resources. The object of such association to be *inter alia* these :—

- (a) To collect information regarding the mineral capabilities of the different parts of the country.
- (b) To investigate past history of the mining industry in the country.
- (c) To study the question of the development of such mineral resources with the advice of experts and in the light of experience in other countries.

- (d) To send out Indian experts—as the Japanese did at the start—say men like Professor V. S. Sambasiva Aiyar of Bangalore, to study in other countries the working of the mines and the systems prevailing there of mining legislation, mining labour and mining education.
- (e) To arrange to disseminate amongst the people the information so collected and the results of such study and investigation in other countries by means of cheap Vernacular literature, peripatetic lecturing, exhibitions, &c.
- (f) To create a healthy, well-informed public opinion on the subject and with a view to the end to start a mining paper, and to have mining institutes established at various places for discussions and study.
- (g) To organise mining enterprises in promising tracts and otherwise assist in the organisation of such efforts.
- (h) To render assistance in prospecting work in such cases.
- (i) To undertake search work independently where there may be good prospects of success.
- (j) And above all to watch and promote in all practicable ways the mining interests in the country, &c., &c. The associations will require funds for their own museums, laboratories, &c.

No large practical effort in the desired direction would seem possible and no healthy start without the aid of some such organisation.

Lastly, we desire to point out that this question relating to the mining and metal industry does not affect the British Provinces alone. It concerns the Native States as well, where a similar situation exists. Many of these States possess considerable mineral resources, notably the Nizam's dominions, Rajputana, Gwalior, Cutch, Rewah and Kolhapore. And we submit that it is a duty which the rulers and administrators of these States owe to the populations under

their rule to do what in them lies to resuscitate this ancient industry. Every important State and group of State should have a mining expert to advise in the matter. The necessary surveys, the experimental trials, &c., should be carried out under his supervision, and no effort should be spared to call out and encourage indigenous enterprise in the field. It is further worth remarking that the Native States Governments can do even more in the matter than the Government of India, and accord to private efforts a larger measure of direct and indirect aid—in the shape of guarantees, subsidies, bounties, and special concessions regarding prospecting and mining leases.

These are some of our ideas on this important subject of the mining and metal industry in the country, and here we must bring our observations to a close, apologising for the length to which they have extended. In the preceding pages, we have pointed out how great and varied are the mineral resources we possess ; how mining and metal work was at one time one of our most prosperous industries in the land—supporting a numerous population—and how in recent years, under modern conditions and owing to the impact of unrestricted foreign competition, it has unfortunately suffered a most grievous collapse. We have dwelt at length on some of the calamitous results which has followed from such a failure of an ancient and extensive industry not only to large sections of the population, but to the general industrial life of the country. And we have pleaded with all the earnestness we could command for some practical action with a view to its revival, and rebuilding on modern lines. In our opinion, the work of such revival and rebuilding should be entirely our work—and ours alone—with just the kind and measure of State-aid that may be absolutely necessary : and we have ventured to sketch out a rough plan on which such work might be arranged and carried out under the existing circumstances both in the British Provinces and in the Native States. We humbly trust, the scheme of practical action so submitted—and submitted with diffidence—will meet with the approval of the Conference.

The movement here advocated is—as things are at present in India—rather one along a difficult line of advance in the industrial field ; and the effort required is a large, vigorous, strenuous and sustained effort. And like every other effort of the kind, it must depend for its effecting initiation and successful prosecution upon the popular and other support it may enlist. It is a self-reliant effort conceived in the best interests of the country, and under the new *Swadeshi* awakening, we have no doubt it will receive all the aid it needs. Further we may also count upon the generous and cordial assistance of Government in such efforts the one sole object of which is the development of the industrial resources of the country and with it the amelioration of the condition of the people. And with such help and support, the new effort has every prospect of assured success ; and when it succeeds—as we hope and pray it may by the blessings of Providence—and the industry revives as part of a general re-building of our national industrial system, we trust India will be in a fair way to be once again what she was for centuries—one of the richest and most progressive Mining Countries of the World—the land *par excellence* of gold and plenty and bliss. And in the progress of the *Swadeshi* movement we have already the dawn on the hills—the dawn of a new era of hope and promise.

“ And the light is Victor, and the darkness
“ Dawns into the Jubilee of the ages.”

THE DEVELOPMENT OF THE MINERAL RESOURCES OF INDIA.

By T. H. HOLLAND, Esq., F. R. S., *Director, Geological
Survey of India, Calcutta.*

Obviously, before sketching out a line of advance, it would be wise to take stock of our present position, and to determine the trend of recent progress in mineral developments. Recognising this principle, much of my time has been devoted lately towards improving the system of collecting statistics

of mineral production and of critically analysing the results. The first essay in this direction has been published by Government in the form of a review of progress made during the years 1898–1903.* For the assistance of those who wish to follow the subject with closer detail than is possible in this paper, I propose to make that review the basis of the first part of my remarks, modifying the conclusions stated therein by the extension of data to the end of 1904.

Those who have had occasion to consult the Review of Mineral Production for 1898–1903 will have noticed that the first table of figures professes to express the total value of minerals produced within the period under discussion. It is the first attempt we have made to express the value of our mineral produce in terms of a standard currency, and to the critical student of political economy it is not necessary to do more than point out the shortcomings which are specially attached to this particular statement in addition to the imperfections common to, and confessedly inseparable from, all such methods of expressing the value of natural products (see table).

Value of Minerals for which returns were available
in 1898 and 1904.

	1898. Rs.	1904. Rs.
Gold ...	2,41,27,560	3,54,91,185
Coal(<i>a</i>) ...	1,43,57,430	2,09,82,390
Petroleum(<i>a</i>) ...	10,18,461	71,09,565
Salt(<i>a</i>) ...	53,83,990	65,62,950
Saltpetre(<i>b</i>) ...	39,88,440	39,95,235
Manganese-ore(<i>b</i>) ...	4,11,389	19,44,480
Mica(<i>b</i>) ...	8,08,350	14,68,980
Rubies ...	8,69,250	13,59,180
Jade stone (<i>b</i>) ...	6,26,700	7,60,890
Graphite(<i>a</i>) ...	1,650	3,00,720
Iron-ore(<i>a</i>) ...	1,86,045	1,89,255

(*) Records, Geol. Surv. Ind., Vol. XXXII, Part I, January 1905.

(*a*) Spot prices.

(*b*) Values on export.

		1898.		1904.
		Rs.		Rs.
Tin-ore(a)	...	38,295	...	1,25,295
Chromite(a)	...	...	...	62,055
Diamonds	...	35,000	...	39,540
Magnesite(a)	...	...	...	13,140
Amber	...	15,915	...	12,570
<hr/>				
Total		5,18,68,475		8,04,17,430
<hr/>				

The chief amongst its special shortcomings is one which we hope gradually to reduce, though we shall never wholly exterminate, being due to the omission of items for which even approximate returns are at present unobtainable. One of the largest of these, and one of the most important in determining the progress of a country, is that of common building materials. The extent to which structural materials are used in a country would form a better measure of its industrial progress than even a periodical census of its population if we could but express their quantity and nature in terms of any recognised standard. But it will be many years before we shall be able to assume with safety that the returns for building materials in India conform to the recognised test of all statistical expressions in covering all but an unimportant fraction of the total.

This claim can be made, however, for the sixteen minerals included in the table of total values now given, and it is hoped gradually to enlarge this list until the residue of those left unestimated is a fraction too small to distract our percentages, or materially to affect the curve of progress. The table is obviously not intended to afford a means for comparing the mineral production of India with that of any other country: it merely gives us at a glance the rate of progress which is being made, the same system of expression being followed from year to year. Used in this way, it will be seen that the total production of minerals for which approximately accurate

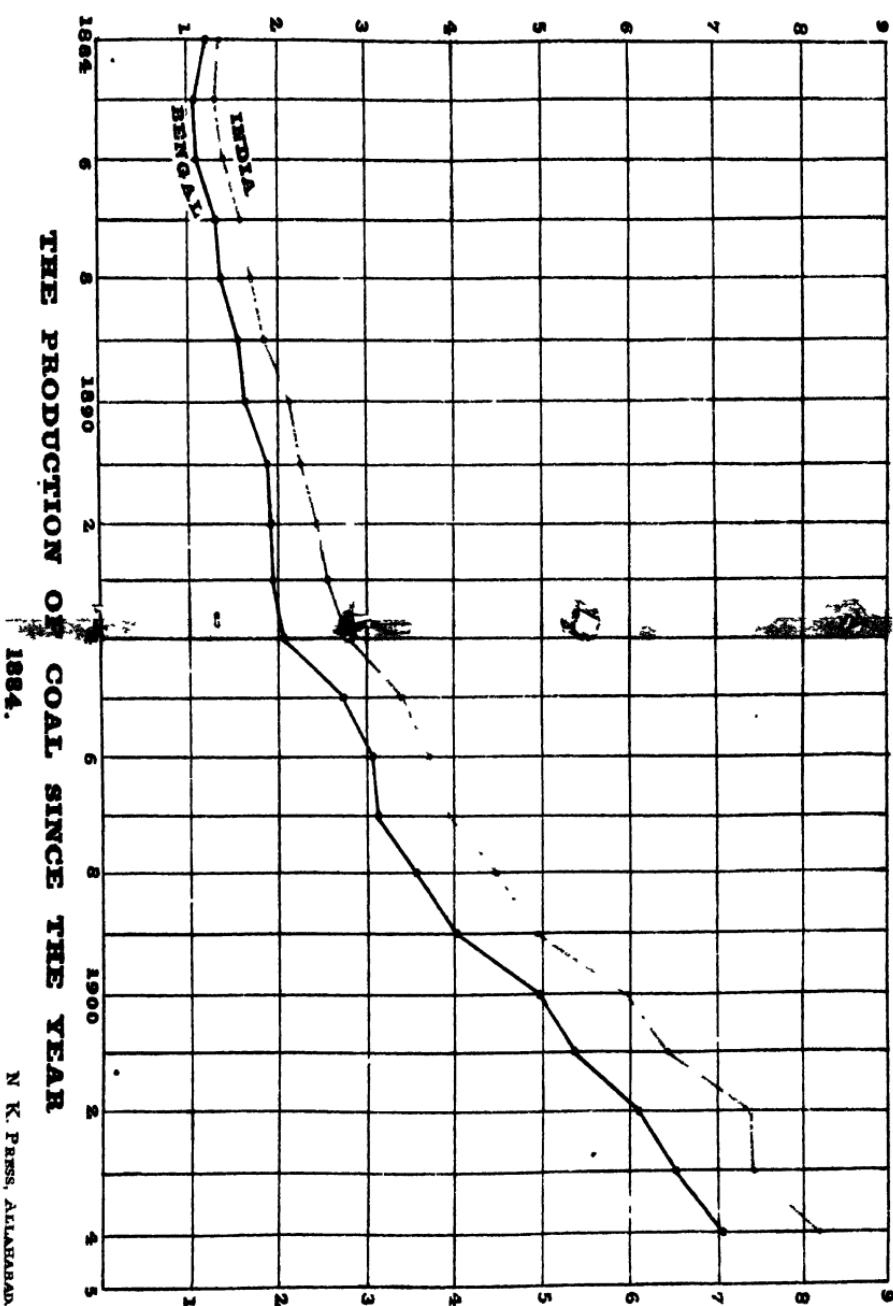
VALUE OF MINERALS RAISED IN INDIA.

MINERALS	1898	1904
GOLD	2,41,27,560	3,54,91,185
COAL (a)	1,43,57,430	2,09,82,390
SALT (b)	53,83,990	65,62,950
SALT-PETRE (c)	39,88,440	39,95,235
PETROLEUM (a)	10,18,461	71,09,565
RUBIES	8,69,250	13,59,180
MICA (c)	8,08,350	14,68,980
MANGANESE-ORE	4,11,389	19,44,480
JADESTONE (c)	6,26,700	7,60,890
IRON-ORE (c)	1,86,045	1,89,255
GRAPHITE (d)	1,650	3,00,720
TIN	38,295	1,25,295
MAGNESITE (d)	—	13,140
AMBER	15,915	12,570
DIAMONDS	35,000	39,540
CHROMITE	—	62,055
TOTAL	5,18,68,475	8,04,17,430

(a) SPOT PRICES.
(b) PRICES EXCLUDING DUTY.
(c) ESTIMATED VALUES.
(d) ESTIMATED VALUES.

(e) EXPORT VALUES.
THESE VALUES ARE FOR PROVINCES OTHER THAN BENGAL.

MILLIONS OF TONS.



K. PRESS, AELAHABAD.

and trustworthy returns are available has risen in value from about 5½ crores of rupees in 1898 to over 8 crores in 1904, that is, an increase of 55 per cent. in six years.

Considered as a mere rate of progress in value of output, this table is extremely satisfactory; but a critical review of the constituents of our yearly totals reveals a seriously weak feature in the present state of the industry. The most valuable amongst the minerals raised are either consumed by direct processes, without contributing to subsidiary chemical and metallurgical industries, or are mined simply for export. The obvious cause of these weaknesses and the probable cure for them will be discussed when we have briefly surveyed the chief items in mineral production.

The mineral of greatest value to the country is undoubtedly coal, for 94 per cent. of the mineral produced is consumed in various industries in the country. The actual money value returned for last year's output of coal amounted to more than 2 crores of rupees, but such an expression gives only an imperfect idea of its value; for whilst the value of Bengal coal is returned at the average rate of about Rs. 2·6 a ton, that of the inferior material raised in Burma is reported at about Rs. 7 a ton. The so-called values given in our general table are thus more accurately described as local prices, varying, naturally, according to the relation between the cost of production and the demand of the nearest market. The average pit mouth price of Indian coal is less than half that of coal raised in the United Kingdom, Australia and Canada, and is about two-thirds of that raised in the United States. Even taking into account its slightly inferior calorific value, there is still a great saving in fuel charges for those who will undertake the enterprise of reviving the decayed metallurgical industries of India to compete with the foreign metals for which we have now to pay such enormous bills.

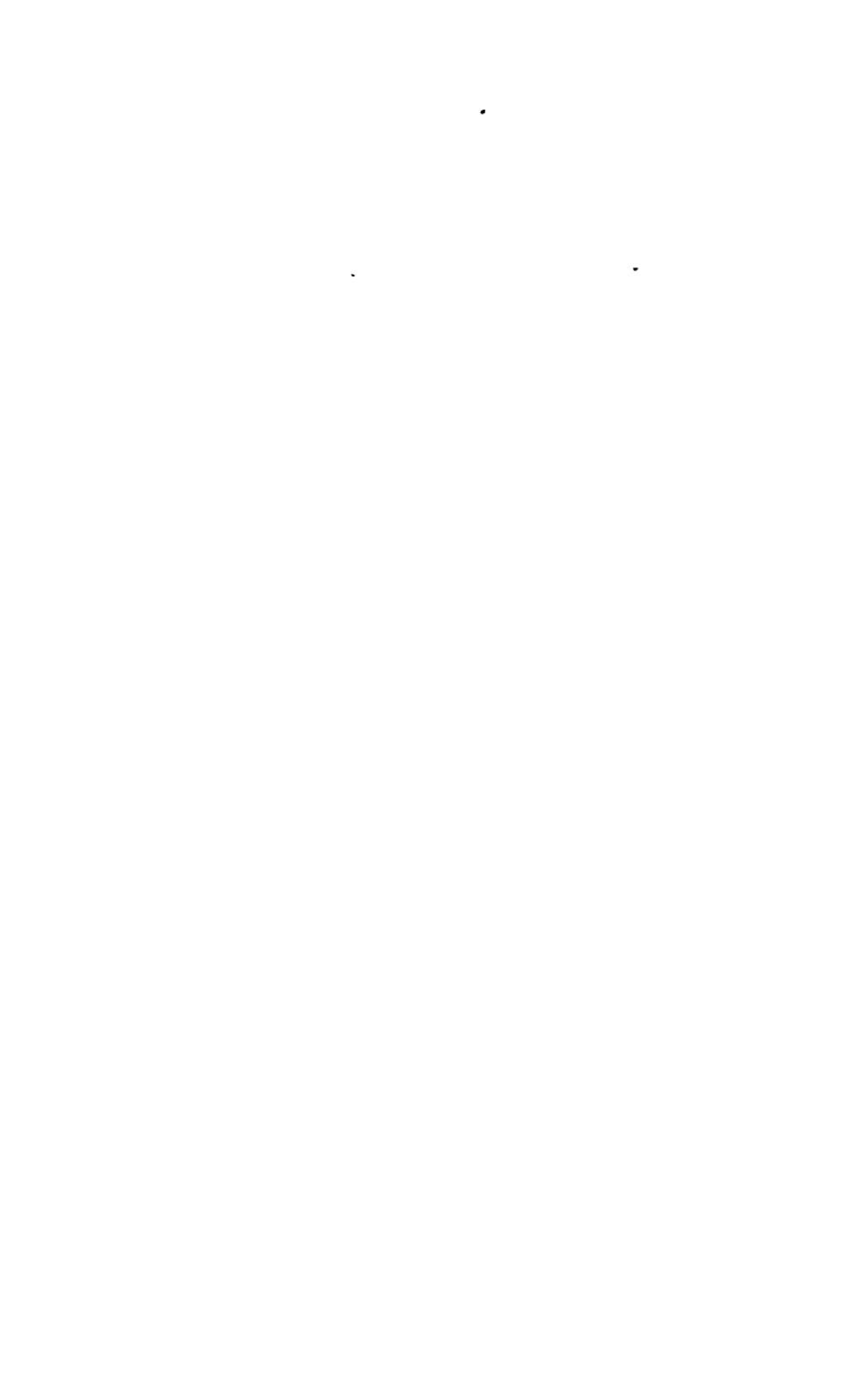
The coal-mining industry began in the Raniganj area as long ago as 1777, but the industry was naturally restricted to local requirements until the East Indian Railway connected the field with Calcutta in 1854. Since then, the output has risen from about 300,000 tons in 1857 to 3,350,257 tons in 1904.

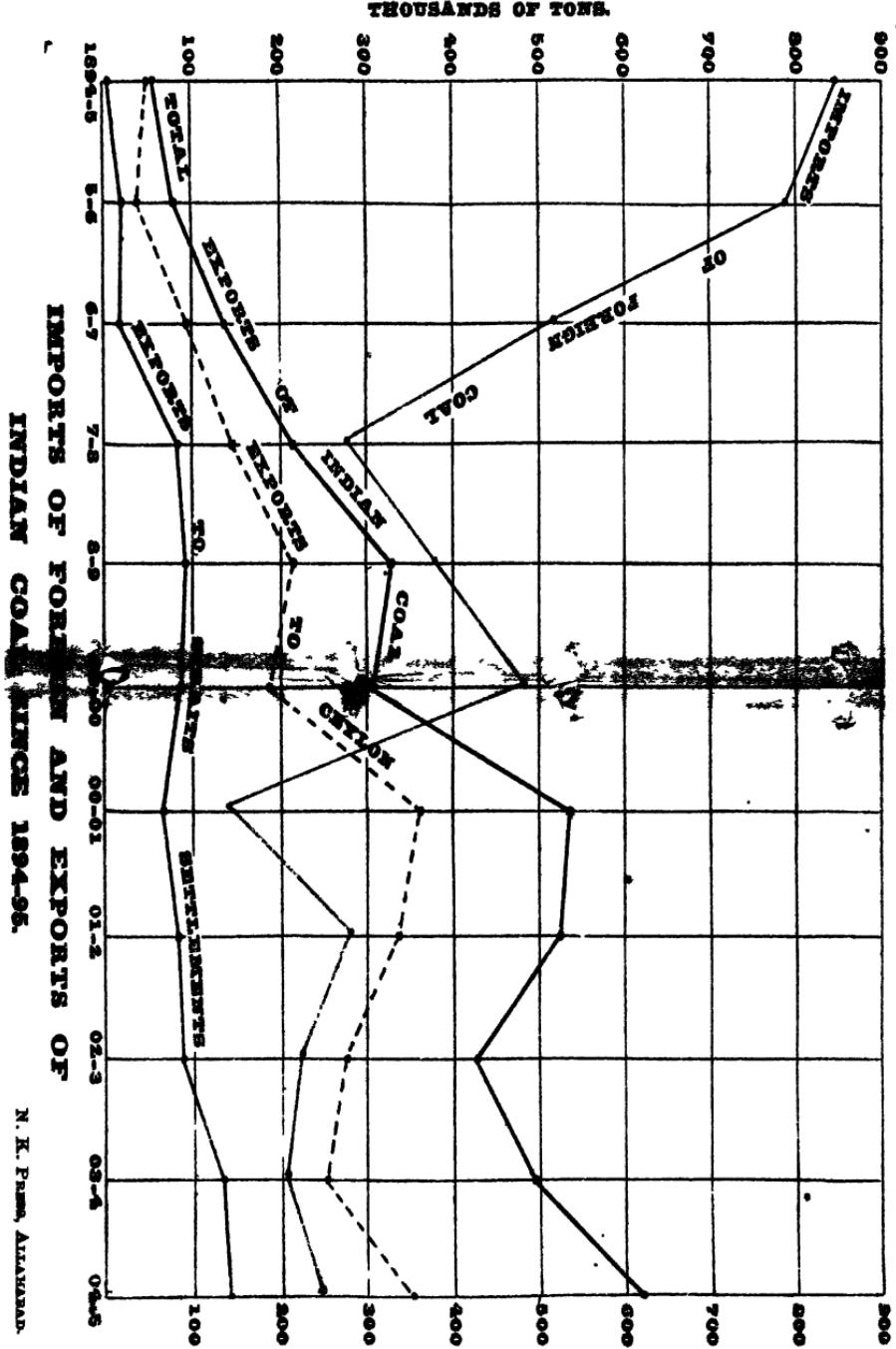
Until 1870, the output for the Raniganj field represented the total for India ; but with the distribution of railways, other coal-fields in Bengal became opened up, and finally the deposits known in the Central Provinces, in Central India, the Nizam's Dominions, in Rajputana, Punjab, Baluchistan, Assam and Burma contributed to swell each year's total until 1904, when the coal production for India during the year reached the record of 8,216,706 tons.

Practically every feature of the coal-industry can be regarded with satisfaction by those interested in the progress of the country. Imports of foreign coal have been gradually reduced to about 250,000 tons a year ; the proportion of foreign coal consumed on our railways has been cut down during the past twenty years from over thirty to under one per cent. of the total ; new markets have been found in the Indian Ocean ports, with the result that exports have exceeded the imports and last year reached 602,810 tons ; although the railways still take about 30 per cent. of the coal produced, there is a tendency for this proportion to diminish, showing that other industrial enterprises requiring fuel have developed faster even than the railways, and that the enormous rise in production is a true index to industrial progress. I can point to one regretful feature only in this trade, and that is the fact that in many mines the resources of the thick seams have not been fully turned to account. This loss, so far, is, however, an unimportant item compared to the enormous stores of coal that we know still lie untouched, and the systematic mining, now being enforced under Government regulations, framed from a purely humanitarian standpoint, has a secondary effect in producing increased efficiency and more complete utilization of the stocks of marketable coal.

From the worker's point of view the coal-mining industry is equally satisfactory. Over 100,000 workers are employed directly in connection with coal mines in India, and the death-rate from accidents is lower here than in any coal mining country in the world.

In this respect, coal-mining compares favourably with gold and mica mining which maintain a much smaller number

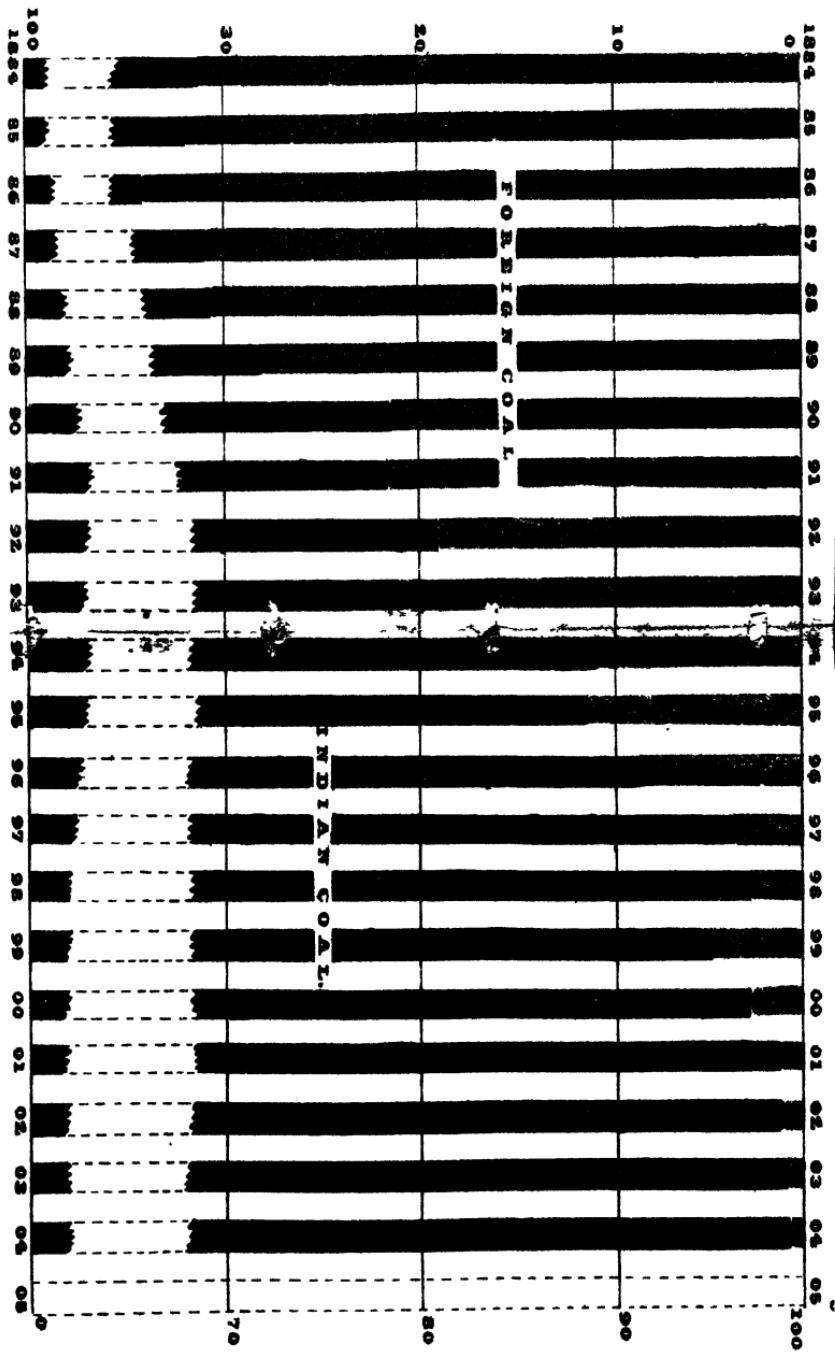






RELATIVE CONSUMPTION OF FOREIGN AND INDIAN COALS ON
INDIAN RAILWAYS SINCE THE YEAR 1884.

PER CENT. OF TOTAL CONSUMPTION.



of workers, whilst in Bengal, where the natural conditions are so favourable to safe underground work, the average death-rate from coal-mining accidents is distinctly lower than in any other Province or State. If risks to life were estimated by coal-mining in India, the industry would not be classed amongst "dangerous" occupations : there is not only a low rate from isolated accidents, but a remarkable freedom from disasters, which, in European countries, have done more than accurate statistics to force special legislation for the protection of workers engaged in "dangerous" occupations.

When one sees in a coal-mining district the general happiness and well-to-do condition of the miner, one is inclined to regard the dangers incurred as fairly gauged by the proportion between the results of accidents and the numbers who find congenial and profitable employment. The Indian collier, in this respect, is far better off than any other in the world. He can earn higher wages than those engaged in simple agriculture, he is now being provided with suitable quarters under sanitary conditions, and is encouraged on the best-managed collieries to acquire fields for his own use. The general attractiveness of the industry is revealed by the great increases in the population shown by the last census for the civil sub-divisions in which mining has mainly developed. In the Giridih sub-division there was an increase of 4 per cent. between 1891 and 1901, whilst in the Gobindpur sub-division of Manbhum there was an increase in population during the same period of 25 per cent. One feature of the industry, which appears to be slowly diminishing, is the comparative inefficiency of the Indian miner : in this country we turn out about 80 to 90 tons of coal a year for each worker employed ; for the rest of the British Empire the annual output per collier is about 285 tons.

Amongst the remaining minerals, the most conspicuous progress has been made in developing the petroleum resources of Burma. During the past ten years, the production has risen ten-fold, the output of crude oil last year amounting to 118½ million gallons. The imports of foreign oil have been

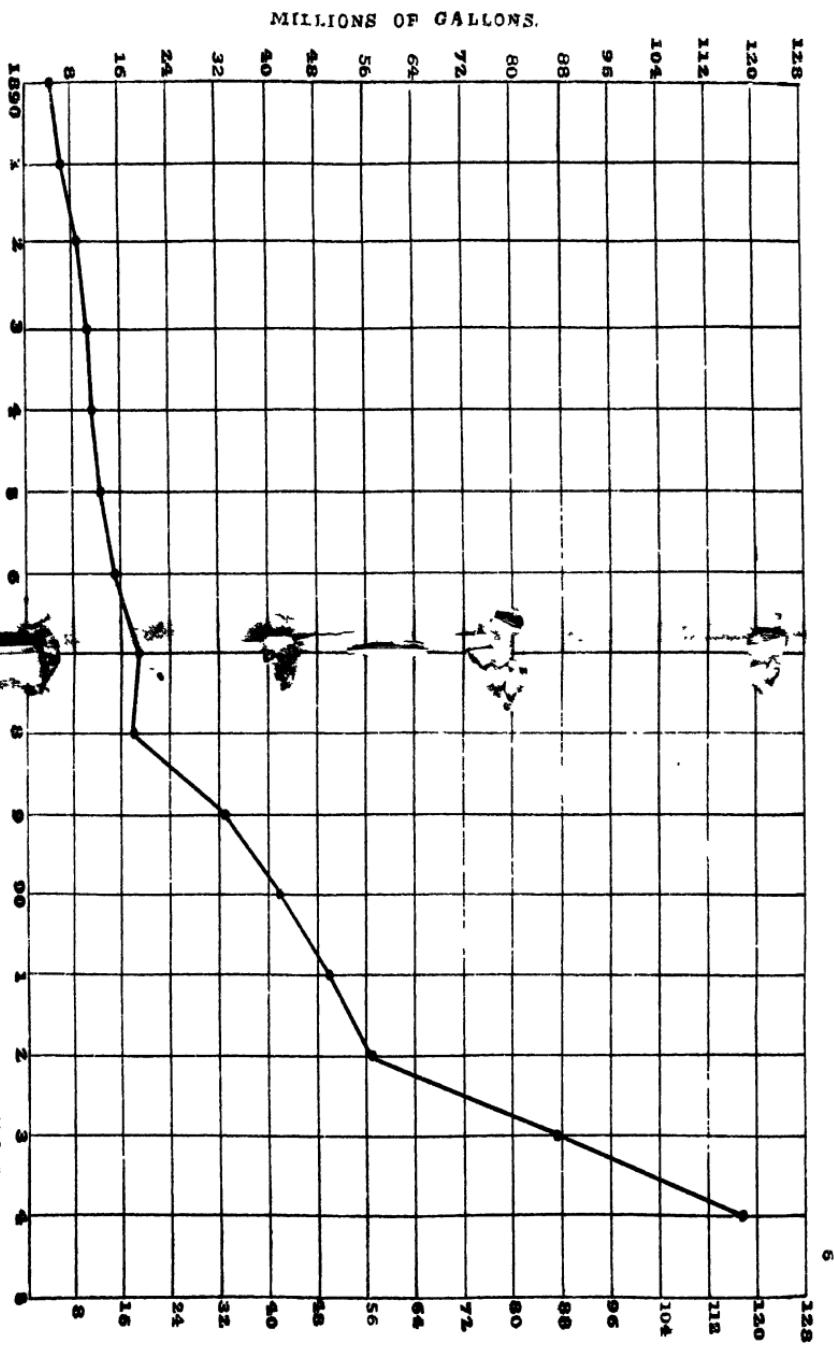
largely displaced by the home production, which enjoys the slight protection of the difference between royalty and import duty. At the same time, there has been a valuable trade created in the export of Indian kerosine and of paraffin wax obtained from the crude oil, these exports in 1904 being worth 28 lakhs of rupees.

The old method of raising oil from narrow shafts 200—300 feet deep was the only system followed by the hereditary oil-diggers until Upper Burma came under the British Administration in 1886, when deep wells were drilled by the Burma Oil Company, and the lower sands, containing the largest supplies of oil, hitherto untouched, were exploited. Since then, the output has rapidly risen in the Yenang-yaung field alone to the extraordinary figure of 73 million gallons in 1904.

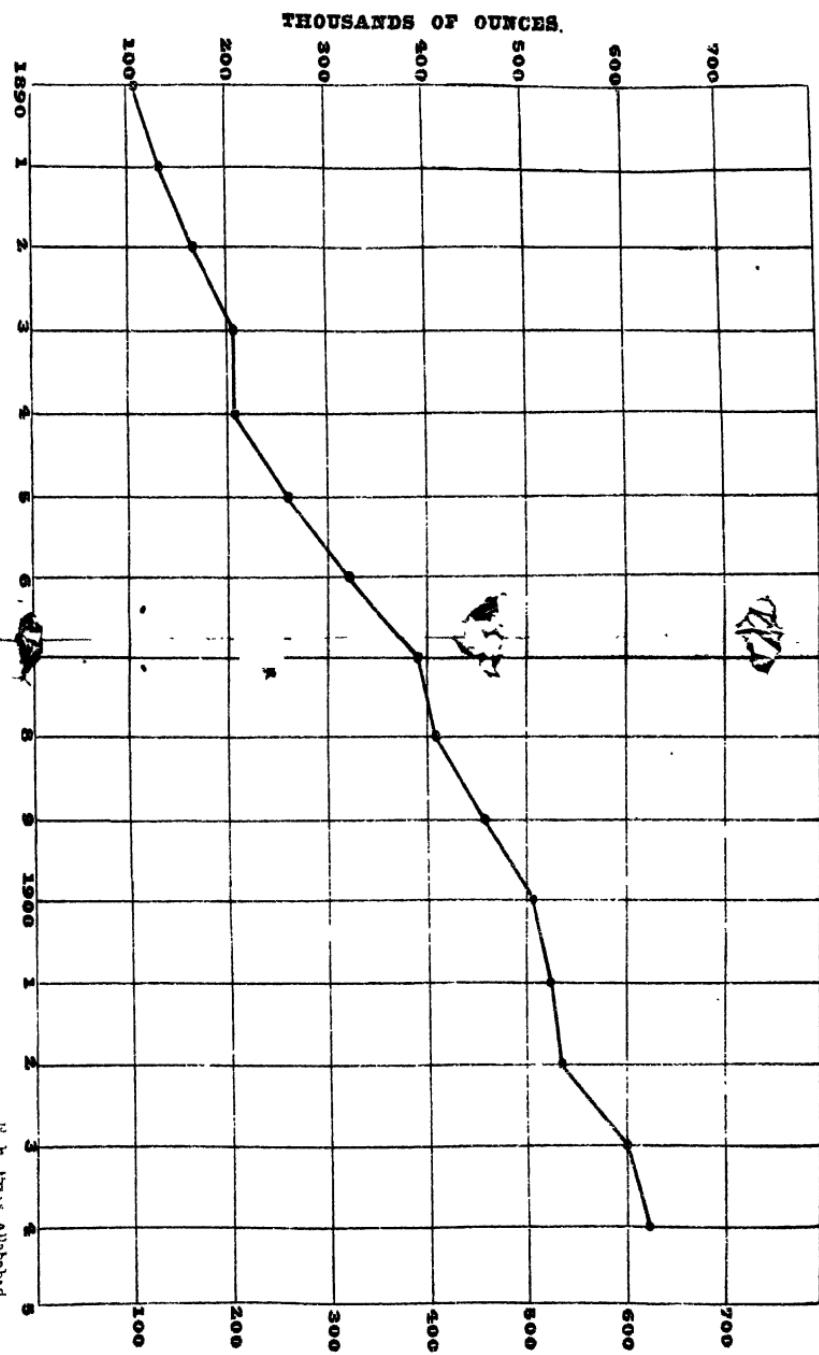
The petroleum trade in Burma supports a large population of labourers on the field, in the refineries, and in the transport trade; the increased output has been a source of profitable revenue to Government; the importer has been compelled to keep his prices down to face competition with the native product, and in every respect but one the whole industry has been a source of solid wealth to the country. The one regrettable feature is the fact that the capital required to drill the deep wells has been raised in Europe, and the profits consequently have left the country. In the petroleum industry, as in so many other enterprises of the kind, India will continue to pay such an unnecessary and undesirable tax as long as those in the country who possess money will not risk their reserve funds in industrial enterprises.

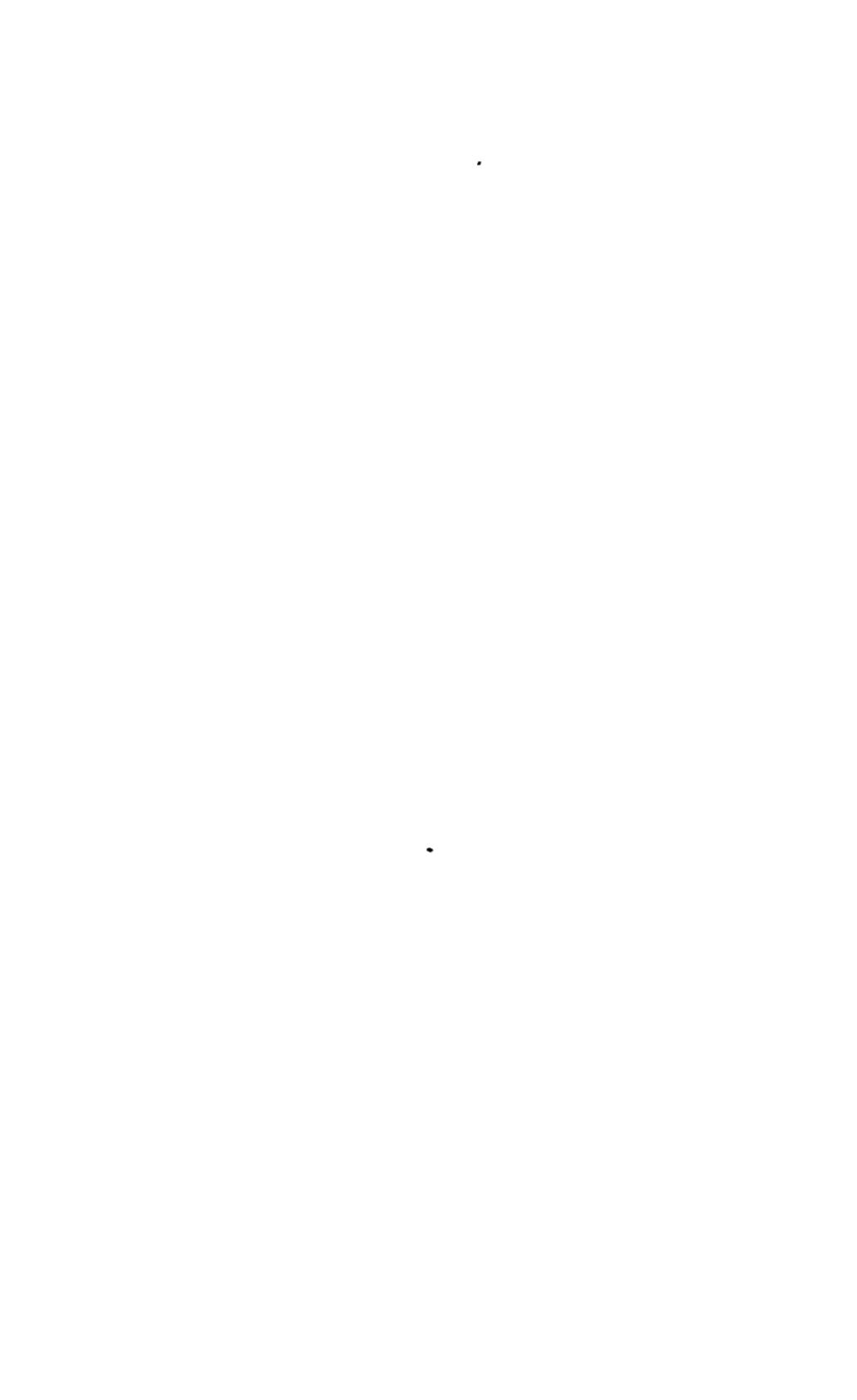
The other large mineral industries which produce a rosy picture by a yearly expanding table of values cannot be regarded with unalloyed satisfaction. Nearly 30,000 workers are maintained by gold-mining, a certain number of luxuries are obtainable in the two centres of production, and over a million sterling has been retained in the country in the form of royalty; but more than eight times the royalty has been paid in dividends.

PRODUCTION OF
PROBLEUM SINCE 1890.



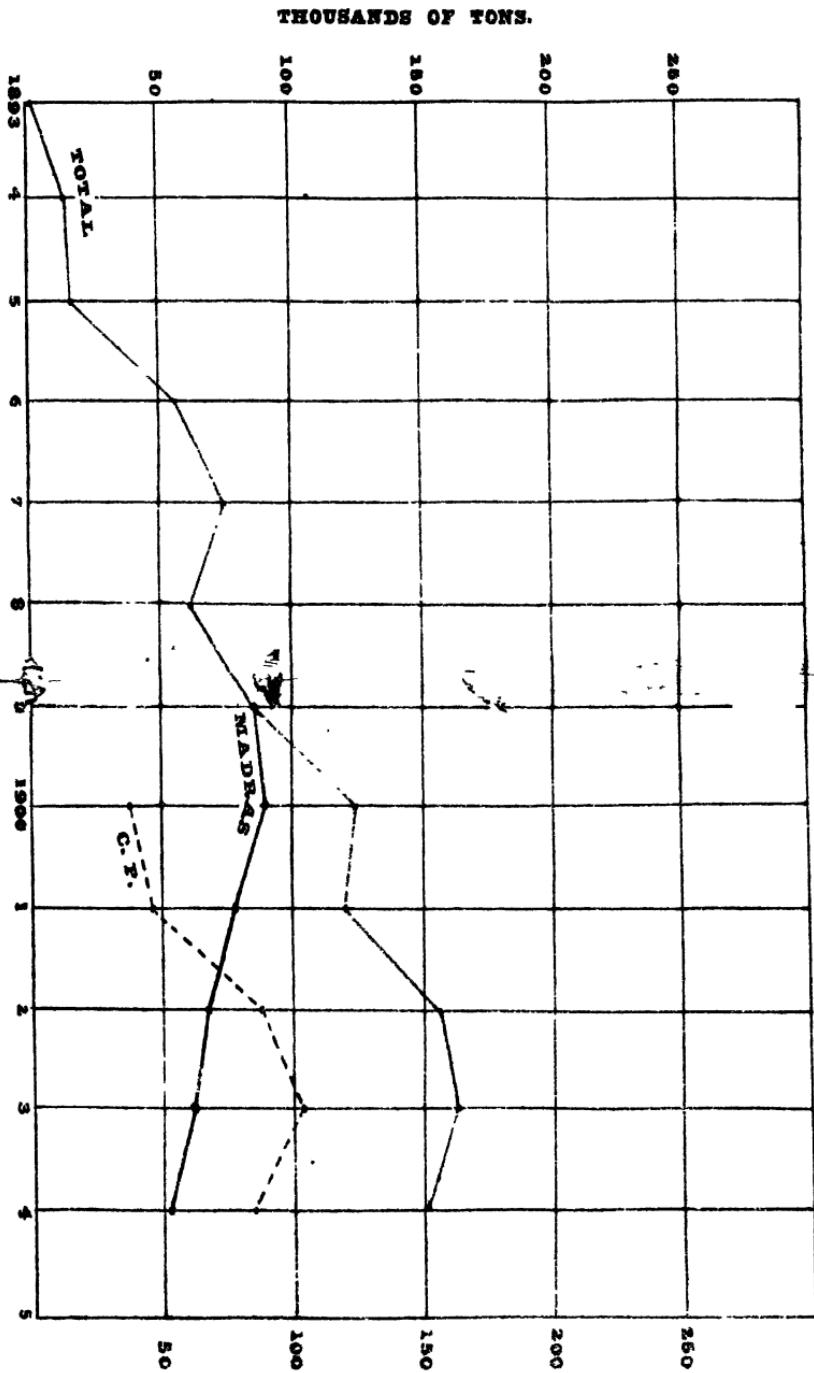
PRODUCTION OF GOLD SINCE 1890.





PRODUCTION OF MANGANESE-ORE SINCE
THE COMMENCEMENT IN 1893.

N K PILLAI, ALLAHABAD



Rubies, obtained on a much smaller scale in Burma, may be ranked with gold ; both are limited in value to the royalty and the local support of labour. But our loss of metalliferous ores, of fertilizers and of minerals employed in the great web of industrial arts necessary for the maintenance of a civilized community is in no sense compensated by the individual profits obtained by a few workers and traders.

It is in the belief that the dissemination of information about our imperfections as well as our resources will in some small degree assist in placing our mineral industry on a sounder economical basis, that I have, with the full sympathy of Government, accepted the invitation of your committee to address this Conference. It is with the assurance that we possess in the country the natural elements essential for the restoration of our decayed metallurgical and chemical industries that I have diverted the energies of my colleagues, and have commenced the expenditure of public money for the investigation of our resources in minerals which are essential to industries now maintained entirely by imports, for which we have not only to pay heavy bills to other countries, but to exist always in a state of absolute dependence for articles that are no longer mere luxuries.

Thirteen years ago, India produced no manganese-ore at all. This year our output of the ore will not be exceeded by more than one or two of the twenty countries that contribute to the World's tram supply. Manganese-mining may thus be looked upon as a successful new industry, one that helps to swell the table of total values, and to give an impression of industrial expansion. It is better that manganese-ore should be raised for export than be allowed to lie idle in the ground ; but this country receives no more than fifteen out of the thirty rupees that a ton of manganese-ore is worth at an American or European port. We thus not only lose half the value of the mineral, but have to pay again for the metal it contains in the large imports of steel, for which India is still practically dependent on Europe. The same thing has now commenced in connection with the chrome iron-ore. To the miner the chrome-ore is worth about 23 shillings a

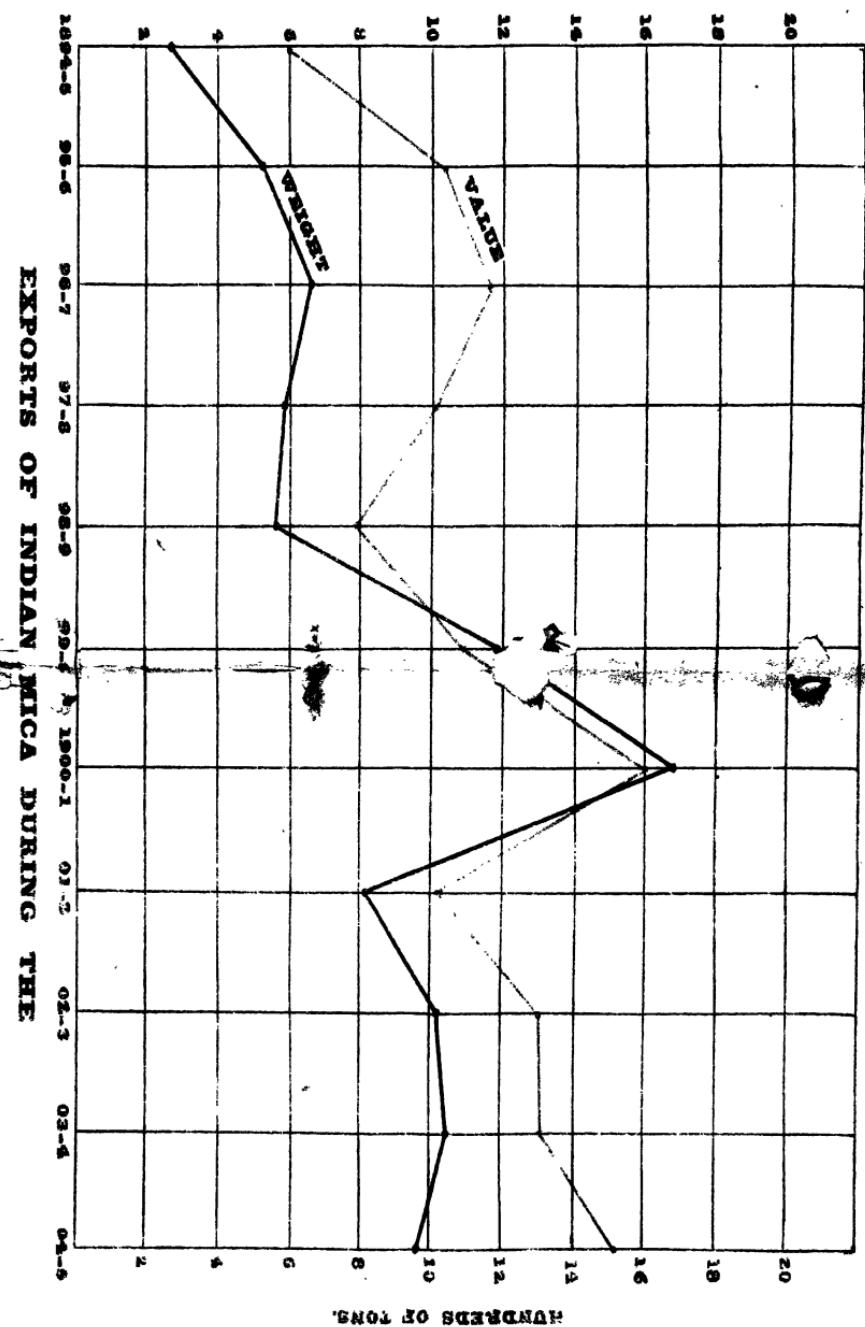
ton, whilst the European manufacturer pays 75 shillings for it. Until iron and steel are manufactured on a large scale in India, we have to submit either to this imperfectly compensated drain of the mineral resources, or the still less profitable alternative of allowing the minerals to lie undeveloped.

I have seen it stated as a matter for regret that India has lost the place it once held as the World's supplier of saltpetre. There was a time when saltpetre, being an essential constituent of gun-powder, gave India a place of special political importance amongst the nations, when during rumours of war saltpetre became an object of speculation as dangerous as the consols of the countries involved in a possible war. Since then, the potassic nitrate of India has been largely displaced by the discovery of large quantities of sodic nitrate in Chili, and its use in the manufacture of gunpowder has been curtailed by the invention of other and more efficient explosive chemical compounds. Although we still export nearly 20,000 tons of saltpetre every year, the trade shows a tendency to diminish rather than expand, and as long as our agriculturists and planters remain in a state of ignorance as to its value, it is better to reap the profit obtained by export than to leave the substance lying idle in the soil. But it would be still more profitable if we could turn it to its natural use as a fertilizer, and with this end in view, the Agricultural Department has been experimenting, hoping to reduce its cost of manufacture, as well as to discover to which of our crops it can be most profitably applied.

About 53 per cent. of the constituents of saltpetre are obtained indirectly from the air under the peculiar meteorological conditions which exist ideally in Behar ; the remaining constituent exists in unlimited quantities in our soil. We consequently possess the power of indefinite reproduction, and that which is exported thus leaves the country none the poorer. But the case is otherwise with our export of bones, of which we lose nearly 100,000 tons every year. Nine tenths of the constituents of bones consist of phosphate of



LAKHS OF RUPEES.



EXPORTS OF INDIAN MICA DURING THE
PAST 11 YEARS.

lime derived from the soil, and consequently what is exported in this form is so much lost in the way of material essential to the production of our grain crops. As India is poor in phosphatic deposits, the time will come, if this drain is not compensated, when the soil will begin to show its deficiency in phosphates. But there is a form of compensation within our reach, and I will deal with this point after reference to one or two other unfavourable features in our balance sheet of exports and imports.

In preparing the data for the review of our mineral production recently published by the Geological Survey, the two features that struck me most forcibly were, firstly, the remarkable development of minerals consumed by what conveniently might be called direct processes, such as coal, gold, petroleum, gem-stones and salt, or which are raised merely for export, such as manganese-ore, graphite, salt-petre, mica, tin and chrome iron-ore ; and, secondly, the equally pronounced neglect of the metalliferous ores and the minerals essential to the more complicated chemical and metallurgical industries.

In these respects, India of to-day stands in contrast to the India of a century ago. The high quality of the native-made iron and steel, and the artistic products in copper and brass once gave the country a prominent position in the metallurgical world. To-day the manufacture of iron by the primitive *lohar* has been restricted to small local industries, limited to areas far removed from the railways and ports, which have permitted the importation of cheaper goods from Europe ; copper and brass-wares are made entirely from imported metals ; no lead-mining now exists in the country, while the once flourishing manufactures of alum, the various alkaline compounds, blue vitriol, and copperas are now all but exterminated. These facts are expressed in our returns for imports. Our imports of minerals, chemicals, and metals amount to over 10 million sterling (15 crores of rupees) a year, without counting articles manufactured from metals and minerals, such as glass-ware, earthenware, porcelain, hardware, cutlery, machinery, millwork

and railway plant, much of which would be obtained in any case from foreign countries whether we raised the necessary raw materials or not. But so far as I can find, with the exception of quicksilver, which is the smallest item in the bill, there is not one amongst the imported minerals and metals not known to exist in the country. I am not prepared at present to say that all of them exist in quantity sufficient and in a form suitable to displace the foreign article in open competition ; but the most valuable certainly do so exist, and it is towards the development of these that our energies should be directed.

It is, however, not sufficient merely to know that we have unlimited supplies of a mineral, to assert that we can face foreign competition. The case of copper will give a convincing illustration. In 1901 our imports of copper were valued at about one crore of rupees ; in 1904, on account mainly of the extended use of electric power, these imports had risen to over 2½ crores of rupees. The increased demand for copper naturally directs our attention to the copper-ores which were once worked in India and known to occur in large quantities. But our ores, like those largely worked elsewhere, are copper sulphides, and we know that such ores are worked elsewhere with profit only because the sulphur as well as the copper is turned into marketable products. It is thus not enough to know that we have a demand for copper : we cannot work our copper-ores against foreign competition unless we have a market for the bye-product sulphur. To make use of our sulphur, we must have a demand also for sulphuric acid sufficient to take all that will be produced in smelting the copper-ores. To find a local market for sulphuric acid, we must have other chemical industries, many of which cannot exist unless their bye-products are also marketable in the same area. To extract the metal, therefore, with profit, it is necessary to find an assemblage of smaller industries in order to utilize the bye-products economically. Consequently chemical and metallurgical industries do not exist singly, but in family groups.

In this case we have an illustration of the way in which the European manufacturer has killed the native Indian chemical industries. He has turned his bye-products to full account, and with the reduction in freights, following improved forms of transport, he is able to compete at distant points with those who work minerals for one or only a few of their constituents. On account almost entirely of the economic recovery of bye-products, the price of sulphuric acid in England has been reduced during the last seventy years from over £18 to under £3 a ton ; at the same time, the dependent manufacturer of soda-ash has reduced his prices from over £16 to about £4, whilst bleaching powder has dropped from about £19 to £3-10s. Since the opening of the Suez canal, with the reduced cost of transport by improvements in marine engineering, eastern freights have dropped to about one-fifth of what they were before the canal was opened. In consequence, the European manufacturing chemist is able to place his bye-products at a profit in parts of India where the same compounds are formed by the natural processes of a tropical climate, and merely require extraction.

It looks at first sight as if we could never recover our lost metallurgical and chemical industries. But the rapid spread of railways in India, the gradually extending use of electricity, and development of manufactures connected with jute, cotton and paper have gradually increased the demand for chemicals and metals, until now we have probably reached the stage at which the quantity and variety of products required will be sufficient to form an outlet for the bye-products that are necessary in a well-defined family circle of chemical industries ; and the protective effect of sea-freights will assist in the competition with the materials of European manufacture.

I have already cited the case of copper as an example of a metal for which there is a rapidly increasing, and so far as one can judge, of a permanently increased demand on a scale sufficient to produce large quantities of sulphuric acid. When I took up this question two years ago, the first

doubt to settle was the extent of a market for the sulphuric acid, for at present the acid imported is a comparatively small quantity, limited by the enormous cost of its freight. A certain amount also is manufactured, but its price is also of necessity kept up by the cost of importing the required sulphur. Obviously, to judge the possible market by the present consumption of sulphuric acid in India, would give us little hope of developing our copper sulphide ores. Knowing, however, that sulphuric acid, in the presence of a sufficient number of raw materials, and of certain industries would rapidly make its own market, we turned our attention to the possible outlets in India. The import returns reveal a small demand for certain inorganic chemicals which are made by the direct use of sulphuric acid, and although we are safe in assuming that the demand for them would increase by a slight reduction in price, there is not enough in these imports to warrant the expectation of a local market large enough anywhere in India to absorb all the sulphur separated in the copper-smelting on a scale that would pay. We had thus to develop the conditions necessary to create a market. The Forest Department have consequently brought out an expert to test the suitability of our woods for the manufacture of paper pulp by the use of sulphurous acid, and the Agricultural Department are making experiments to test the fertilizing value of ammonium sulphate, in the hope of retaining our now wasted products in coke-making, and of superphosphates, in the hope of retaining our supplies of bones and of importing mineral phosphates from the large deposits in the Indian Ocean island.

Of the subjects of these experiments the one of most immediate importance is perhaps ammonium sulphate. About 300,000 tons of coal are converted every year into coke on the Bengal coalfields by a process which loses nitrogen enough to make ammonium sulphate worth 20 lakhs of rupees in the open market. As soon as this fact was brought to the notice of the owners of our collieries, enquiries were made as to the economical results of erecting bye-product recovery plant instead of the cheap open kilns now in use, and the

East Indian Railway Company, acting on the advice of Mr. T. H. Ward of Giridih, have already commenced the erection of the necessary plant, intending, in the first instance, to use sulphuric acid manufactured from imported sulphur until the supplies lying idle in this country can be turned to account.

Some idea of the value of ammonium sulphate can be obtained from the way in which it is being used in Java and Mauritius. Nearly 30,000 tons of this fertilizer are now consumed every year on the sugar plantations of these two islands, and as one consequence they made India pay last year something like 4 crores of rupees for sugar which ought to have been grown in this country.

To show the value of recovering bye-products, one might quote instances by the hundred illustrating the way in which countries, relying solely on the reproductive value of a tropical climate, have had to give way gradually to the more cheaply made artificial products due to scientific developments in Europe. The case of sugar which I have already mentioned affords an illustration striking enough to us, as it affects a large industry in this country.

The beet-root sugar of France, Germany and Austria is sometimes referred to as an illustration of the value of a protective tariff and bounty in fostering an industry ; but there is little doubt that these influences have been microscopic compared to what has been done by scientific work, first, in the agricultural treatment of the beet, and, second, in the processes of extracting the sugar. There was a time when the beet-root yielded less than 9 per cent. of sugar : roots now grown yield 16 to 18 per cent. These facts illustrate the first lesson to be learnt by us in India where our agricultural products are left to natural selection and chemical fertilizers are practically unknown. The second advantage obtained by the beet-sugar refiner has been through the adoption of the best machinery in the processes of extraction, of chemical processes to obtain the last traces of crystallizable sugar from the molasses, and finally of converting the residue of evil-smelling waste products, formerly a general nuisance to be got rid of at a high cost, into valuable chemi-

cal products like salts of potash, ammonia and the ferrocyanides, which now contribute to the profits of the industry instead of being a loss. As one result of the application of science to sugar manufacture in Europe, Austria alone last year sent sugar to India to the value of 138 lakhs of rupees. When a country, with a temperate climate, can beat the manufactures of a natural tropical product in their own climate, and at a distance of 5,000 miles it is time for us to review our methods of work with critical faculties well alert. How many other Indian industries, depending solely on the advantages of natural conditions, are in danger of extermination by applied science in Europe ?

The trade of this country so far has been mainly a simple exchange of natural products peculiar to a tropical climate for artificial goods of European manufacture. Obviously the outward half of this trade balance must suffer with the rapid development of science in Europe, enabling the manufacturer to turn out of his waste products the materials suitable to replace those growing luxuriously in India. To what extent the danger can be reduced in connection with vegetable products is beyond my province to judge ; but in questions relating to minerals, I think the conditions are rapidly ripening for the successful developement of numerous products now obtained from Europe. The rapidly growing imports of metals, chemical and mineral products are daily maturing the conditions necessary for us to open up our mineral deposits with new methods ; the extension of railways and engineering works is increasing our requirements in iron and steel ; the utilization of electric power has created a demand for copper ; the development of industries connected with paper, cotton, jute and agriculture is forming a market for chemical bye-products.

Metalliferous ores cannot generally be developed except on a scale sufficiently large to make the recovery of the smallest among these bye-products remunerative. When the European manufacturer, therefore, was once able to reach the Indian market by low freights, our native metallurgical and chemical industries naturally became exterminated, and

must remain so without chance of revival until the variety and quantity of subsidiary products required in the country are sufficient to absorb the products of metallurgical works erected on a scale comparable to those now established in Europe. It is useless to start with methods and on a scale already superseded in the countries with whom we have trade conditions restricted only by existing freight rates. The individual worker in metallurgy or in most forms of mining must give way in the future to the company with limited individual risks. But we have the advantage of starting with the matured results of metallurgical evolutions in Europe, and the conditions are now, or soon will be, ripe for the exploitations of some of the minerals hitherto left untouched.

To turn our opportunities to account, it is necessary, firstly, to disseminate the information we already possess, secondly, to obtain more precise information of local conditions by an increase in the number of those who possess the necessary technical and scientific knowledge, and thirdly, to discover more enterprise on the part of those who can contribute to the necessary capital.

With regard to the first point, information is being distributed by publications issued by the Geological Survey Department as fast as suitable data are collected. Our *Records* are supplied to various libraries, societies, newspapers and individual subscribers; all known mineral occurrences of value are represented by collections of specimens available to the public in the Calcutta Museum, and we are now engaged in the preparation of a Manual which will give a summary of everything that has ever been written about Indian minerals; but we have still to look to Conferences of this kind to assist in the dissemination and thorough assimilation of the published reports.

The second condition must await the slow extension of secondary and technical education in India. It will be many years before there will be an effective proportion of the general population able to detect local occurrences of valuable minerals; but the end in view may be somewhat

hastened by a wider knowledge of the fact that the Geological Survey Department will willingly determine minerals free of charge for any amateur who is willing to give the precise locality from which each specimen is obtained, although we do not wish to assist those who, thinking they have discovered possible diamond mines and goldfields, prefer to keep their information secret in hopes of waylaying some innocent speculator.

The third condition is perhaps the most serious difficulty of the lot. Nearly every valuable mineral development in this country has been due to the enterprise of a few Europeans, the preliminary work of exploration no less than the subsequent risks of prospecting and working. As one consequence I could name many Europeans who have dropped the money they have made in other ways; for few industrial enterprises involve more indeterminate risks than mining. As another consequence, where success has followed enterprise, the profits are leaving the country in the form of dividends instead of remaining here to contribute to the general wealth. A striking case is now developing in connection with the enterprises initiated by the late Mr. J. N. Tata, whose great name will be perpetuated by the Institute founded by his generosity to remove complaints like the second of the three that I have just named. As most people are aware, Mr. Tata for some years undertook the investigation of the many known iron-ore deposits in Central India with the hope of finding one under conditions suitable for the local manufacture of iron and steel. After his lamentable death, the work was taken up by his two sons, Messrs. D. J. and R. J. Tata, and after an expenditure of over three lakhs of rupees in the work of investigation, they have at last evolved a project which appears to contain the elements of a sound industrial venture. But Messrs. Tata and Sons have been compelled to go to England to raise the capital necessary to launch a project that ought to commend itself to every patriotic capitalist in this country. One would feel happier if there were more leaders of the kind of the Tata Brothers in India—men whose ventures, inspired by

patriotic motives, are conducted with cautious regard to the business risks involved. I have been privileged to keep in touch with each stage of their most recent enterprise. Mr. J. N. Tata started with the idea that some amongst the many occurrences of iron-ore reported by the Geological Survey must surely be suitable for exploitation, and consequently ought to be developed for the benefit of the country. The preliminary information with regard to actual occurrences seemed sufficient to warrant the expenditure necessary to test the most promising; and on these systematic prospecting operations were undertaken, no step in expenditure being ventured not warranted by the information derived from that already completed, until the investigations narrowed down to the thorough testing of the two ore-bodies determined to be the best by the more superficial preliminary tests. Being certain that ore of the right kind existed in sufficient quantity, they subjected the other raw materials necessary for flux and fuel to equally exhaustive tests, and finally selected as the centre of operations the point which gave the most favourable results in an equation involving (1) the cost of the three groups of raw materials of different quantities, (2) the market for iron, steel and bye-products accessible at various distances in counterbalancing the competition with imports and existing manufactures, and (3) the suitability of water supply and climate for the workers as well as the works. I have seen no mineral enterprise undertaken in this country in which the scientific method has been so completely adapted to business essentials, and Messrs. Tata and Sons deserve the gratitude of everyone interested in the welfare of India.

The patriotic feelings of the late Mr. J. N. Tata formed merely the *inspiration* of the great project about to be launched; if, however, the subsequent steps had not been undertaken with regard to financial results, one would have been justified in doubting either the sanity or the honesty of the promoters. The desire to see the country economically independent will not be accomplished by merely patriotic demonstrations against foreign goods. Their importation

can be prevented only by the manufacture in this country of the same quality at lower rates or of better materials at the same price. To do this, enterprise is wanted more than self-sacrifice—enterprise on the part of students willing to take up technical subjects instead of law, philosophy and literature ; enterprise on the part of capitalists ready to invest intelligently in industries now taxed by borrowed capital.

It would be impossible in a short paper to indicate the many ways in which mineral developments are possible in India, and I doubt if any good would result in the publication of matured plans until there is a community sufficiently grounded in applied science, not only to turn the present opportunities to account, but to adapt itself to the changing industrial equation as science progresses elsewhere.

The Geological Survey can do no more than accumulate and publish for general information the raw materials which form the basis for a more thorough investigation of local problems. We have, for instance, recently announced the existence in various parts of India of ore similar to that used in Europe and America for the manufacture of aluminium. Before that ore can be turned to account, we want a cheap supply of alkali for the extraction of the alumina ; the manufacture of the alkali involves the simultaneous manufacture of bye-products for which a market must be found ; to convert the alumina into aluminium, we want a cheap source of power ; and finally a market for the metal turned out. To deal with this problem, we have thus to determine by systematic prospecting whether any one of the known occurrences of the ore contains the alumina in sufficient quantity to support works on a large scale, whether it is present in sufficient richness to permit of economical extraction, and whether the ore-body, when found to be suitable, is within range of the necessary power, the necessary materials required for its manufacture, and a market capable of absorbing the bye-products as well as the metal. The discovery of a valuable mineral is thus but the beginning of a long problem, necessitating the collaboration of a string of competent investigators. Our poverty is not in material, but in men

capable of turning the natural material into the finished product. We want more than Government provision for technical scholarships : we want a reformation in the *tastes* of our students ; we want them to learn that the man with technical dexterity is of more use to the country than the writer of editorials or the skilful cross-examiner ; that applied science now belongs to the highest caste of learning, and is a worthy field for the best ability we can obtain.

As far as our mineral resources are concerned, there is unlimited room for profitable enterprise : the country is sufficiently endowed by Nature, not only to meet its own requirements, but to take advantage of its central position for competing with others in the Indian Ocean markets ; but until we find the chemical, metallurgical and mechanical workshops as attractive to our high-caste students as the class-rooms for law and literature now are, the cry of *Swaradeshi*, no matter how worthy the spirit it embodies, will remain but an empty word.

COTTON CULTIVATION IN BENGAL.

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The backward state of cotton cultivation in India strikes one as an anomaly when one reflects that it is the chief article which clothes her millions, that India is the birth-place and nursing-ground of cotton manufacture, that the arts of spinning and weaving cotton were known to the Hindus long before the Egyptians wove their clothing from the fibrous-bark of their native flax, and that those arts flourished here even before the date of authentic history. It is from India that cotton manufacture spread to different countries, towards the East to China and Japan, towards the West and across the Continent, to Europe, and perhaps also to the farthest antipodes.

Wool and materials for linen were never wanting in India, but the people were not slow to perceive that cotton-clothing was more agreeable to wear in temperate climates

and in torrid zones, and that it was much better calculated to preserve the warmth of the body than linen. It is to the manufacture of cotton, therefore, that the ancient Hindus directed their attention, and they gradually acquired a flexibility of fingers and a dexterity of manipulation which adapted them in a remarkable degree to the finest and most artistic operations of the loom. They thus succeeded in attaining unapproached perfection in their fabrics of cotton, and have maintained their supremacy for ages, in spite of the marvellous appliances which science has placed in the hands of foreign manufacturers. The cotton piece-goods, calicoes and muslins which were manufactured in the country not only formed the staple clothing of the people of India, but were also sent out from remote times, in large quantities, to Arabia, Greece, Turkey and other countries. Towards the end of the seventeenth century the beauty and cheapness of Indian muslins, chintzes and calicoes attracted the attention of the English, and the quantities in which they were imported to England by the East India and Dutch Companies raised a loud outcry against the admission of Indian goods to the prejudice of English woollen and silk manufactures. The desired protection to English manufacture was given by Acts 11 and 12, William III, Cap. 10. (1700), which forbade the importation and use of Indian silks and calicoes under a penalty of £200 alike on the wearer and the seller. The other Governments, too, of Europe found it necessary to prohibit them, or to load them with heavy duties in order to protect their own manufactures. The check thus imposed on the growth of Indian cotton manufactures was further aggravated by the introduction of the fabrics of Great Britain in Bengal to an extent which proved the ruin of the manufacture of cotton in India. Even so early as 1831 a large number of Indian manufacturers petitioned the Lords of His Majesty's Privy Council for Trade representing the disastrous effects caused by English enactments and import duties, and praying their Lordships "to allow the cotton and silk fabrics of Bengal to be used in Great Britain free of duty or at the same rate which may be charged on British fabrics

consumed in Bengal." But this reasonable prayer was not granted. The result was the surprising commercial revolution which was effected in the mutual relations of the two countries. India, so long superior to Europe, India, which inundated the West with the products of her looms and exhausted the riches of Europe, even India, so long a victor, now lay vanquished in her turn, a prey to foreign commercial aggression. The British merchant carried the raw material to his country, committed it to the operation of the machine, carried back the products to the East, and, in spite of the loss of time and the enormous expense incurred by the double transport, sold the cotton fabrics at a price less than the price of the cotton spun and woven by the hand near the field that produced it, and sold at the nearest market.

The loss to the country occasioned by the transfer of the manufacture of cotton piece-goods from India to England has been aggravated by the state of cotton cultivation in India. By far the largest portion of cotton goods imported from England is spun from American cotton. It has driven Indian cotton out of the European markets ; while even in our own country the raw material available for manufacture in the mills, is fit only for the manufacture of rough and coarse fabrics. Should the success of the *Swadeshi* movement lead to the establishment of a large number of cotton mills in India, we should have to face the difficulty of getting an adequate supply of good cotton for our mills. The area under cotton in India and Burma has varied from 9 to 11 millions of acres between 1890 and 1903 ; while in Bengal, the area under cotton, which has never been large, has shown a tendency to decline. In 1898-1899, the area under cotton in Bengal was 151,500 acres ; but in 1902-3, it came down to 87,400 acres, and in 1904-5, it was, as the Hon'ble Mr. Carlyle declared, on the 2nd of December last, from his place in the Council Chamber, only 90,000 acres.

It is not, however, merely in quantity but in quality as well that cotton production is in a backward state in Bengal. Bengal cotton is much inferior to foreign cotton. Not only are the filaments wanting in proper length and strength, but

dirt, seeds, leaves, the broken shells of pods, and the rubbish collected from the ground are permitted to be mixed up with the staple. It is further adulterated by middlemen by the admixture of old and inferior cotton. The inferiority of the staple and the admixture of impurities are due not so much to the neglect and ignorance of the cultivator as to his poverty. The ground is not well prepared, the soil is not thrown up into ridges, the seeds are not carefully selected and are sown broadcast, the fields are not carefully weeded, the soil is not treated with suitable manure, irrigation is neglected, and the ryot does not wait for reaping his crop as it ripens and the pods open but is obliged to sell his crop very often before it is ripe in order to pay the land rent and the costs of cultivation. It is small wonder that in such circumstances the quality of the cotton is not what it should be, and that the yield is barely 20 lbs. per bigha, while the average yield in America is more than 200 lbs. per acre. Long before America presented herself as a rival, the quality of Indian cotton had attracted the attention of the Court of Directors. In 1803, they complained that "dirt and leaves mixed with the wool had depreciated the value of the cotton sent them," and in 1810, they wrote to Bombay "that no excuse will hereafter be admitted by us for the foulness, dirt and seeds which are permitted to remain mixed with the cotton; and it is our positive orders that the commission be not paid to any commercial resident whose provision of cotton shall be faulty in this particular."

In their laudable endeavours to develop the material resources of the country the Government of India have made for no one object such earnest and persistent efforts or undergone such heavy expenditure of money as for the extension and improvement of cotton cultivation in India. The experimental cultivation with American seed was made so early as 1828, model farms were established in a number of places, every attention was paid to the improvement of indigenous varieties, cultivators were encouraged to adopt foreign crops, prizes were given for fine specimens of produce, and long leases on easy terms were granted to

properly qualified Europeans on their engaging to grow approved kinds of cotton.. I would refer those who wish to read the history of those experiments to Dr. Royle's "Culture and Commerce of Cotton." These experiments have been attended with a certain amount of success both in the Bombay and Madras Presidencies as well as in Central India. It is a recognised fact that the Bombay Presidency in spite of its area is the largest cotton-growing Presidency in India.

There is no future for cotton cultivation in Bengal so long as it depends solely on the resources of the cultivators. Ignorant of the rules and methods of growing a crop with which they are not familiar and which requires careful cultivation, wanting in enterprise enough to undertake it with the risk of failure and an uncertain prospect of profit, the Bengal ryot, unaided, would be wholly unable to produce cotton of a certain quality and send it to the market in a condition capable of challenging competition. The superiority of Bombay cotton is due to merchants and mill-owners having come into closer connection with cultivators in the matter of the cultivation of the staple and the harvesting of the produce, after they had despaired, from long experience, of leaving the processes to the ryots themselves. It behoves the landholders of Bengal, Behar and Orissa to take an earnest interest in the cultivation of cotton in their estates and to direct to it their most unwearied exertions. Cotton is at this moment one of the most paying crops in India, and fortune is within easy reach of those who may invest their money and devote their energies to its cultivation. By the last official returns there are more than 13 millions of acres of cultivable waste in the Province of Bengal. The soil and climate are favourable to the cultivation of cotton. Experience has shown that it grows equally on the sea-board, in alluvial flats and in the uplands, and we may hopefully rely upon the advantages of a soil recovered fresh from Nature's hands. All loamy, calcareous and even kankur and sandy soils are suitable for the cultivation of cotton. It is only stiff, clayey and damp soils, and too rich soils that make crops run into stalks and leaves, which should be avoided.

The seasons for sowing cotton are at the end of the monsoon after the heavy rains are over, and, in some places, at the beginning of winter. Deep ploughing is essential for the cultivation of cotton. It enables the plant to get an extra amount of nourishment, and, as observed by the late Mr. Rivett Carnac, it makes "the plants much stronger and healthier than their neighbours." The clods should be broken and the soil well pulverised and thrown up into ridges. Too much care cannot be taken in a judicious selection of the seed. Men of ability, distinguished for their practical knowledge and scientific acumen, have devoted their attention to the question of selection of cotton seed for India. A number of gentlemen recommended the introduction of American or Egyptian seed and their acclimatisation in India; while the result of the experience of other persons is that although the best crops are obtained from freshly imported seed, the foreign variety grown from acclimatised seed rapidly degenerates. Men are, however, not wanting who would have nothing to do with foreign seed, and would rely on the gradual improvement of the indigenous seed by careful cultivation of the crop and selection of the seed. Mr. Carlyle observed truly at the meeting referred to above that the question is still in the experimental stage. The seed having been selected, it should be soaked in cow-dung and water or in a solution of saltpetre for 12 hours and then allowed to dry in the sun for an hour. The seeds should be drill-sown, two or three seeds being dropped into each hole about three feet apart and covered with a little earth. The cost of the ridge system exceeds but a little the cost of the broad-cast system, but its evident advantages in respect of weeding irrigation and reaping are great. When the plants are five or six inches high, and, if necessary, once or twice afterwards, the grasses and weeds should be thoroughly eradicated. It is necessary also to thin the crop, the strongest plant only of each cluster being left, and, if the plants grow too luxuriantly, the tops should be nipped off and the growth of lateral branches encouraged. Mr. Chapman truly says in his

valuable work published only a few months ago that the agricultural chemistry of cotton is still in its infancy. But there can be no question that substances containing phosphates of lime, such as cotton seed cakes, ashes of cotton plants and bone dust could be profitably used as manures for cotton crops, while all nitrogenous manures should be avoided. The doubt once entertained as to the efficacy of irrigation in cotton cultivation no longer exists. It is now allowed on all hands that cotton of fine quality cannot be grown without the aid of irrigation. The rapid development of Egyptian cotton is due to the cotton fields being periodically flooded by the water of the Nile. Nothing could be more emphatic on the point than the statement made before the Colonization Committee in 1858 by Mr. Balston : "The effect," he said, "of irrigation on the cotton plant of India is to raise it from a small stunted annual, producing 50 or 60lbs of clean cotton per acre, to a large perennial plant, producing 400 to 500lbs, equal in quality to anything grown. * * * It improves the quality of the cotton, and brings it up to the standards of the American crop. * * * Water never fails to lengthen the staple of Indian cotton."

The harvesting of cotton is an important process. The pickings should be begun as soon as the capsules opened, and they should not be allowed to fall to the ground. Three pickings should suffice to secure the whole crop. The first and best pickings should be kept separate from the inferior cotton picked afterwards, and the seeds should be taken from the largest and best developed of the pods picked from the plants. Selection of seeds thus made would improve their quality at each successive cultivation, and it is not too much to hope that Indian cotton would gradually hold its own against the best New-Orleans and Georgia.

About three quarters of the raw cotton of the world is raised in the United States, and about four-fifths of the cotton manufactured in Manchester comes from America. But as the American cotton crop has not kept pace with the increase of manufacture of cotton, England has naturally become anxious to increase the supply of raw cotton from

the countries which constitute her vast Empire and to gradually lessen her dependence on America. This anxiety found expression in the speech His Majesty the King-Emperor made in Parliament in February, 1904. "The insufficiency," he said, "of the supply of the raw material upon which the great cotton industry of this country depends has inspired me with deep concern. I trust that the efforts which are being made in various parts of my empire to increase the area under cultivations may be attended with a large measure of success." It is the interest both of England and of India to make all possible exertions to supplant American cotton in the English market. The Government of India has been alive to the importance of the subject from a very long time. In 1788 the Court of Directors called attention to the cultivation of cotton in India "with a view to affording every encouragement to its growth and improvement." The Government of India have spared themselves neither time nor money to improve and extend the cultivation of cotton in this country, but although they have met with partial success in some places it cannot be acknowledged that they have succeeded in the task they have set themselves. In Bengal, at least, it is the landholders who are responsible for this failure. They have been wholly apathetic as regards the cultivation of this important crop. Possessing the advantages of a suitable soil and favourable climatic conditions, they have hitherto neglected an industry which, whether they be moved by self-interest or actuated by feelings of patriotism, more than demand their strongest support. By undertaking the cultivation of cotton in our estates and devoting our best energies to the enterprise we shall render the supply of cotton elastic in the English market which provides our clothing, we shall make the success of the *Swadeshi* movement in the matter of clothing India's millions with home-made fabrics possible, and shall open a new sphere of activities which would lead to the prosperity both of the landholders and of their ryots.

THE PAST, PRESENT, AND FUTURE PROSPECTS OF THE INDIAN COTTON INDUSTRY.

BY THE HON'BLE MR. VITHALDAS DAMODHER THACKERSEY,
Bombay.

The subject upon which I purpose shortly to address you is "The Past, the Present, and the Future of the Cotton Industry of India." I have ventured to choose this subject as it is one with which I am tolerably familiar, having been personally engaged in Cotton manufacture from my earliest days.

And firstly the Past. The manufacture of cotton dates from a very early period, for we find in Sanskrit records definite mention made of it as being used in India nearly 3,000 years ago. Coming to a later period, the time of Alexander's invasion of India, upwards of 2,000 years ago, the dress of the Indians is described as consisting largely of Calicoes, pure white, or adorned with figures. In the year 73 A. D. Pliny, while enumerating the imports of Europe, amongst them refers to Muslins and Indian Calicoes describing them as of superior excellence. Seventeen centuries ago it was Dacca that sent from its looms those wonderful tissues that adorned the noblest beauties of the Court of Augustus Cæsar. The Muslin known as "running water" formed the choicest gifts which Bengal could offer to its noblest princes or to its foreign conquerors. The fineness of the quality may be judged from an instance recorded that shortly after the advent of the English, a piece of muslin 20 yards long and 1½ yard broad weighed only 14 oz. And yet another instance: a specimen of yarn, which Dr. Taylor examined at Dacca in 1846, measured 1,349 yards and weighed only 22 grs., which is in proportion of 250 miles to a pound of staple, working out on the present standard basis as 524's. count of yarn,—a count which, even at the present most advanced stage of machinery, cannot be produced, and such as has led a competent judge to say that it is beyond his conception how

this yarn, greatly finer than the highest number made in England, can be spun by the distaff and spindle or woven by any machinery. With such rude implements as they possessed the Hindu women almost rival Arachnes' fabled skill in spinning. European ingenuity can afford no parallel. So superior indeed were the productions of the Indian spinning wheel and handloom, to those turned out by the manufacturers of Lancashire in the middle of the 18th century, that not only were the Indian calicoes and Indian prints preferred to the British-made cloth, but the Manchester and Blackburn weavers actually imported Indian yarns in large quantities for use in their factories. The invention of machinery, however, was the turning point.

It was about the year 1771-1772 that the Blackburn weavers taking advantage of the inventions and improvements of Arkwright, Hargreaves and others, found themselves in a position to successfully produce plain cotton goods. The invention of the Mule Jenny in 1779 was the commencement of a new era in the history of cotton manufacture, and subsequent improvements coupled with the utilization of steam power enabled Lancashire manufacturers not only to oust the Indian cloth from European markets, but also to undersell the native production in our Indian markets. It was deemed a great matter with the Lancashire manufacturers when by the aid of mechanical and artistic skill combined with the potent agency of steam, they found themselves able to produce an article considered equal to that which the unlettered Hindu had manipulated in his little mud hut on the remote banks of the Ganges, and which had been produced of like excellence by their ancestors for many previous centuries. The year 1854 marked a second turning-point in the Indian cotton industry, for in that year the first cotton mill was erected in India, and within the first decade as many as thirteen mills were at full work. The following figures show the progress of the Indian cotton industry: -

Year.	No. of Mills.	No. of Spindles.	No. of Looms.
1865 ...	13	285,000	3,500
1876 ...	47	1,100,000	9,100

Year.	No. of Mills.	No. of Spindles.	No. of Looms.
1886 ...	95	2,261,000	17,500
1896 ...	155	3,933,000	37,200
1905 ...	197	5,163,000	50,100

It will thus be seen that within the last fifty years the industry has made giant strides. There are now working in India fifty lacs of spindles and fifty thousand power-looms, giving employment to about two lacs of hands with at least as many dependents upon them. We consume nineteen lacs of bales of raw cotton each weighing 392 lbs., which comes to nearly 60 per cent. of the cotton produce of India. Of yarn we produce about 58 crores of lbs., and of cloth 55 crores of yards weighing 16 crores of lbs. About half of this vast industry is claimed by the City and Island of Bombay, while if you include the whole Presidency the figures work out to 75 per cent. Let me now attempt to show you how this production of Indian mills is consumed. This subject necessitates the introduction of figures which on an occasion like this are generally considered to be very dry. But I shall confine myself to as few as possible.

Out of the total yarn production of 58 crores of lbs. that we produced last year, we exported about $23\frac{1}{2}$ crores of lbs., or 40 per cent., to China and other foreign countries, while we used in our own Indian weaving mills over $13\frac{1}{2}$ crores of lbs., or 23 per cent.; the balance of 21 crores of lbs., or 37 per cent. is used by our handloom weavers and for rope and twine. If we deduct about 10 per cent. of this balance as used for rope and twine manufacture, we have left for the handloom industry fully 19 crores of lbs., against $13\frac{1}{2}$ crores by power looms. In addition to 19 crores of lbs. of Indian yarn consumed by handlooms, a further quantity of 3 crores of lbs. was imported from Europe mainly from the United Kingdom for the use of handlooms. The total quantity consumed by the handlooms, therefore, comes to 22 crores of lbs., nearly double the quantity consumed by power looms. So the hand-weaving industry is by no means a negligible factor,

for its production in cloth is probably twice as much as that of the Indian weaving mills.

Next to agriculture, hand-weaving industry is still the largest industry in the country as the Census of 1901 showed 27 lacs of cotton handloom weavers, besides dependents numbering 28 lacs of persons. This ancient industry has suffered greatly from the introduction of machine-made goods, and though still possessed of considerable vitality, as the above figures show, seems to be steadily decreasing. It may be interesting to know how our production compares with the home demands of India. As I have mentioned above, the cloth production of power looms came last year to 55 crores of yards against 216 crores of yards of cloth imported from foreign countries, approximately four times our mill production. While our mills produce the coarser cloth, say from yarn up to 30's count, and in a few cases upto 40's, the bulk of the imported cloth is of the finer quality using yarn over 30's count. The Indian weaving mills are obliged to restrict themselves for the most part to weaving coarser cloth owing to the inferior quality of cotton now grown in the country. I will not enter at present upon the causes which led to the inferiority of Indian cotton, nor upon the steps taken to improve its quality. Suffice it to say that all concerned are awakened to the importance of the question and Government are making every effort towards improvement of the staple, and this leads us to a short consideration of the future of the Indian cotton industry. The results of experiments conducted in Sind under the superintendence of the Agricultural Department of the Government of Bombay of growing cotton from Egyptian seeds as irrigation crops are eminently satisfactory, and great hopes are entertained of very considerable immediate improvement in the supply of our raw material. If, as is fully anticipated, India shortly produces between two and three lacs of bales of this Egypto-Indian cotton and if, as there is reason to believe from the experiments conducted in Southern India, "Tree Cotton" may be plentifully and successfully grown, it will revolutionize the whole cotton industry. As I have

said elsewhere it would enable the Indian Mills to manufacture finer yarn and cloth for which there is an enormous demand in India, so clearly proved by the import figures I have already placed before you. It may be said that Europe would outbid us for this cotton, but who would doubt the capability of a country growing its own cotton and having a home-consuming market at its doors to hold its own against any outside competition. I am in no way less sanguine of the prospects of our very important handloom industry, although I believe, there is a general impression that it is a small, moribund industry, inevitably doomed to be entirely crushed out by the power loom. Let us not ignore its importance under this very mistaken idea. This village industry gives means of livelihood not only to an immense number of the weaver class, but affords means of supplementing the incomes of agriculturists, the back-bone of India, who usually employ themselves on hand-looms when field-work is unnecessary, and also when, owing to famine, drought, or excessive rains, agricultural operations are not possible. Now the apparatus with which they work is nearly two centuries behind the times. Mr. Havell, Principal of the Calcutta School of Art, Mr. Chatterton of the Madras School of Art, and Mr. Churchill of Ahmednagar, along with many others, are doing yeoman's service by taking keen interest in the question of supplying economical and improved apparatus to the handloom weavers. Mr. Havell has pointed out that in preparing the warp, our handloom weavers are incapable of winding more than two threads at a time, though the simplest mechanical device would enable them to treat 50 to 100 threads simultaneously. The latest European handloom which successfully competes with the power-loom in Cairo and in many places in Europe, can turn out a maximum of 48 yards of common cloth in a day. Mr. Havell is satisfied that the greater portion of the imported cotton cloth can be made on Indian handlooms with great profit to the whole community. The question of immediate revival of the handloom weaving industry on a commercial basis demands the most earnest attention of every well-wisher of

India, and evidence gives promise of a successful issue to efforts put forward in this direction. It will be an evil day for India, if by our negligence and want of support, we fail to place at the disposal of our weavers every improved and economical means of enabling them to profitably pursue their village industry on which directly and indirectly depend an immense number of our people, and drive them to poverty and distress. I commend this subject, therefore, to your most careful consideration.

A DISABILITY AND A DANGER FROM THE POINT OF VIEW OF INDIA'S COTTON INDUSTRY.

By S. M. JOHNSON , Esq , President, Upper India Chamber
of Commerce, Cawnpore.

It is right in a Conference assembled to consider the agricultural and industrial interests of this great continent, and the measures which might be taken to further advance those interests, that those taking part in it should bring prominently to notice any disabilities under which either or both may appear to labour, or any dangers which may threaten or appear to threaten their welfare, and to put forward suggestions for the best means of removing them in the one case or averting them in the other.

One of India's greatest industries—if not the greatest—is cotton spinning and weaving, and if we reflect that after food, clothing is our next greatest need, and that in India cotton fabrics form practically the sole raiment of all its millions, we must admire Nature's wonderful gift of the raw material : for not only can the people of the country grow their own sustenance, they can grow their own covering as well. With such conditions India should be not only the greatest cotton producing country in the world, but it should also be the greatest cotton spinning and manufacturing country in the world, and because it is neither the one nor the other that I am induced to ask you to consider the causes.

To-day I must confine myself to the industrial part of the problem leaving consideration of the cultivation of India's great staple to some other occasion.

The cotton industry we all know is divided into two great sections—Cotton Spinning and Cotton Weaving. Cotton is now almost entirely spun in India by machinery : hand spinning still survives in parts, but it is a moribund industry and does not require to be considered.

Weaving in this country is divided into two branches, viz. power-loom weaving and hand-loom weaving. The proportion of hand-loom to power-loom cloth in India is about 3 to 1, that is to say, there is about three times as much hand-loom cloth made in India as there is power-loom. There is no question but that power-loom cloth can be made possibly better, certainly cheaper than hand-loom cloth ; but owing to the disability under which industries labour in India, and which I shall treat of presently, the power-loom is not worked to its full productive capacity : hence it has not outstripped the hand-loom in the same way as machine spinning has outstripped hand-spinning, and that is the reason why the production of the one is three times that of the other. I know it will be said that perhaps on the whole it is good for India that it should keep to its hand-looms, but that is a proposition that is quite unsound. It is the same question that European countries have had to face before now, and as they have solved it so also will India solve it. If a man with the aid of certain contrivances can make and earn six or ten times as much as another without those contrivances, which think you will gain the day ? If power-looms were worked to as great efficiency in India as they are worked in Western countries, hand-weaving would now be a decaying industry, hand-loom weavers would be finding more lucrative employment on power-looms, and India would be making more cotton fabrics and importing less from abroad than she does at present. These remarks bring me to the two great matters concerning India's welfare which we should ponder over. One is a present disability, the other a prospective danger.

The greatest disability which affects Indian industries is the poor quality of Indian labour. It is one which perhaps in the course of time will undergo alleviation, but the process must necessarily be a slow one; and unless we realize how great a disability it is and strive to remove it, the process must be slower than it need be. Until our labouring classes learn to value thrift, to value labour, and to value time, they can never hope to compete with Western nations. I have mentioned these three attributes, because I think they may be considered as summarizing all that we care to find in labour. A man who is thrifty will always strive to improve himself as a wage earner: if he values labour he will strive to excel whatever his occupation: and if he values time he will strive to do as much as he can in the hours at his command.

These virtues you must all know are conspicuous only by their absence among labourers in India. Go where you will,—search where you may,—you will find everywhere the same complaint, and that is the poor quality of labour, and it is poor because the labouring man is not thrifty,—he only values money for whatever it can give him at the moment without a glance at the future: he does not value work for work's sake,—to him it is unfortunately a matter of complete indifference whether his work is bad or good: he does not value time because his practice is not to do as much as possible in a given time but as little as possible.

With disabilities such as these, can Indian industries ever hope to compete with those of Western nations? I am afraid not. If we are ever able to compete it will be due to some circumstance, some factor which is so predominant that even the poor quality of our labour will not entirely outweigh the great benefit accruing therefrom.

To illustrate the position I will take the case of a cotton weaver in Lancashire. A power-loom weaver there works single-handed from 4 to 6 looms, and will turn out from each an average of 78 lbs. of coarse cloth in a week of 55 working hours or 468 lbs. in all for a six-loom worker. A power-loom-weaver in India looks after as a rule (at all events in the

part of India I am familiar with) only one loom and all he can turn out of a similar cloth in a week is at the best 70 lbs. A hand-loom weaver on an improved hand-loom can weave barely 60 lbs. of very coarse cloth in a week : his outturn as compared with a power-loom weaver would probably be not more than 50 lbs. a week as against the power-loom weaver's 70 lbs. But comparing either with an English weaver I ask you to consider the wide difference : it is that a weaver in Lancashire can do the work of at least six Indian power-loom weavers and nine hand-loom weavers.

Do you think the Indian workman in whatever handicraft he may be employed, can ever hope to compete with the European if the disparity between them is so great, if the efficiency of the one may be taken as six times that of the other ?

And remember this difference is not due to any difference in machinery, the power-loom in India is similar to the power-loom in England, and Cotton Mills in India are as well equipped as Cotton Mills in England : the difference is due entirely to the quality of the labour.

India can never become a great industrial nation until its labour improves—it will never be able to utilize its vast stores of raw material until the Indian labourer is a better working man than he is at present. The disability our industries lie under is the poor quality of our labour and the great question is how it is to be improved. I have had many thousands of Indian workpeople under my observation and the one invariable feature is that beyond a very limited extent and only in rare cases there is never any improvement—the man of 40 is generally not as good as the man of 30—the man of 30 not as good as the man of 20. What is wanted is to improve the condition of the lowest classes : it is not higher education that is wanted, nor the teaching of the well-to-do ; it is the children of the cultivator in the villages and the children of the artizan and the cooly in the cities who require to be brought within the fold and educated so that they will not be divorced from the calling of their parents but sent back to it with all possible speed. The defect in our present system of education is, I think, that

under it these classes escape: it does not reach the lowest stratum, and many of those who are taught are too old and are taught too much and their aims are misdirected. The elementary schools I refer to should never take a child under 7 and never keep him after 9: and he should be taught only the simplest elements, given plenty of physical exercise, and then allowed to go back to assist his parents in their calling and be trained in it whatever it is.

I believe if these preparatory schools—especially in cities—were established, and the absolute rule observed not to take a child over 7 or keep him after 9, that in a few years you would find the intelligence of the labourer really improved, and that this start once made it would go on improving from year to year.

I have treated of a disability and now I will refer to a danger. The danger that appears to loom large in India's future is the danger that her destinies will be directed not so much by what is best for her, but by what is best for other people. I am not going to launch into a tirade against Government. Our Indian Government is I suppose the finest and most beneficent in the world, and British statesmen and British officials are the most upright in the world, but Governments in India are ruled by the party in power in England and parties in England are entirely a matter of votes. When therefore you find British voters insisting on a particular policy, you may be quite certain their representatives in Parliament will support that policy. It is some years now since an Excise duty was put on Indian made cotton cloths: it was put on because an import duty was put on imported cotton cloths, and Lancashire said that if an Excise duty was not put upon the local article, there would be unjust competition between the two.

The import duty was put on for Revenue purposes and not by way of protecting Indian made goods, but remonstrance and protest were equally unavailing: it was of little use pointing out that there was no competition since similar goods were not made in India; the electors in Lancashire insisted that there should be a duty and a mandate from the

British Government was issued accordingly in opposition to the views and desires of British officials in and the people of India.

. Though from year to year the campaign against Excise is carried on as vigorously as it is possible for us to do, there appears no prospect of relief, and now we are face to face with fresh trouble and this is the danger to which I ask your attention and which threatens the vitality of your industries. You have no doubt heard of the long Factory hours recently practised in Bombay,—I have nothing to say in support or defence of a 15-hour day : the practice of these long hours brought down violent not to say hysterical condemnation in Bombay itself and they cease to be practised ; but the echo of them is now reaching us from Lancashire where the most determined efforts are being made to induce the British Government to interfere with the hours of factory-labour in India. The ground on which the Home Government is asked to interfere with our hours of labour are stated to be humanitarian, and there are loud clamours that the hours in India should be similar to those in Lancashire, viz., ten hours a day. Though ostensibly this interference is based on grounds of humanity, the real feeling among Lancashire work-people (and one had only to read its newspapers to see it) is that long hours of work in India mean undue competition with them, and for *that* reason should be stopped. Let us examine therefore these two pleas, first the humanitarian one, and then the undue competition one.

To those who know the conditions under which the factory-hand works in Lancashire, the plea of humanity appears a hollow pretence. Both men and women have to work there 10 hours from year's end to year's end except on Saturdays when they work from 4 to 6 hours. At 6 in the morning, summer and winter, they must be at their work or run the risk of losing their job : steadily so long as the engine revolves they must work—work—work, there is no rest, no cessation, no respite. At 8 they are allowed half an hour for breakfast and about noon one hour for dinner, but for 10 hours there must be steady continuous grinding work. There

is nothing in India to compare with the life of factory-hands in Lancashire, and as to factory girls their lot is indeed a pitiable one. In a recent Lancashire paper I read that for the loss of an eye a woman weaver got compensation at the rate of 2 shillings a week for 6 months : in the same paper there was a report of a case at Rossendale where a girl of 15 attempted to commit suicide because she was threatened with dismissal for not turning out enough work, and another case in the same paper at Elton where a girl of 14 was killed doing what in India would be a man's work. Similar cases are frequently reported, and reading them my profound conviction is that it is the factory-workers in India who ought to go to the rescue of their fellows in Lancashire, and claim on humanitarian grounds that the work there should not be so strenuous, that women should not be employed on men's work, and that intervals should be allowed for recreation.

Indian factories are built in spacious grounds where the workers have unlimited means of recreation, where they bathe, wash their clothes, eat their meals, sleep, and in fact live. The Indian Mill to its workers is their home. Look at the other picture : land in England is so scarce and so costly that actual building space only is as a rule taken up for a Mill ; the sides of the Mills itself frequently forming the boundaries of the property, and the workers step usually from the Mills into the street. That a hand in England should quit his machine to eat, to sleep, to bathe, to wash clothes, to smoke, is an unheard of thing : they are at work continuously from the time they step into the Mill to the time they step out again.

Women by customs of caste and other considerations do not work in any part of a Weaving Mill out here, nor in any part of a Spinning Mill except the reeling room. In Lancashire they work everywhere : a woman weaver there is often better than a man and does quite as much. Where does the plea of humanity come in ?

As to competition it is not the Indian labourer who competes with the English worker : it is precisely the opposite

which is true. If under present conditions and working 72 hours a week, an Indian worker can turn out at the very best only 70 lbs. of cloth, while the European working 54 hours can turn out 468 pounds, what truth is there in the plea that the Indian competes with the European? Is it not the plain palpable fact that even now competition would be utterly—hopelessly—impossible but for some other predominant factor? In the case of cotton it is because we have the raw material, but if that factor were to disappear and our industries so fettered by unjust labour laws that the Indian labourer was placed on the same level as a European labourer, then our industries would disappear as in a twinkling, and the people would have to go back to the land or emigrate. Let me give you an illustration. It costs in Lancashire the equivalent of 14 pies to make a pound of coarse cloth such as is worn by the lower classes in India. This figure does not include the cost of the cotton or the yarn, but simply the cost of making the cloth and all processes previous thereto including such items as wages, stores and coal. In India a similar cloth would cost at least 17 pies. But the cotton or yarn in these cloths is so much cheaper in India than in England that the higher cost of production in India is more than made up in the price of the raw material.

That is one of the reasons why England cannot compete with India in coarse goods: but if this difference were to disappear, which it does as you get up to finer counts, then India could not compete at all.

If you take the cost of freight to India, landing, and agency charges and all other expenses, and also include Excise duty, you need only add at the outside 20 per cent. on to prime cost and in the case I have given you that would mean under 17 pies against 17 pies—so that but for the raw material European countries could at the present moment land cotton goods in any part of India cheaper than they could be made on the spot.

There are very laudable attempts being made to introduce improved hand-looms in India, and I see it stated by Mr. Chatterton, Mr. Havell and others, that with improved looms

the hand-loom woven cloth can compete with that from power-looms. But it is a vain hope: if the power-loom weaver could work even two looms, he could nearly treble the out-turn of the hand-loom : it is because he confines himself to one loom that he pulls the power-loom down to the producing power of the hand machine.

But notwithstanding this the cost of weaving on the power-loom is less than on the hand-loom. In a report to the Government of Madras the other day, Mr. Chatterton said that in Ahmednagar on some improved hand-loom coarse cloth had been made at a cost of about 19 pies per lb.: the figures he gives, however, do not include cost of repairs and renewals, cost of general charges, management and the like. Nor does he make provision for the days when the looms would be idle. If hand-looms were worked together on a large scale, the cost of making cloth on them would certainly always be higher than the power-loom. Taking a similar cloth to that made at Ahmednagar, the cost of making it on a power-loom would be 17 pies as against the hand-loom's probable 21 pies, the equivalent of the English cost for a similar article being about 14 pies.

What our European rivals dread in India is not the hand-loom but the power-loom. If by any means—by curtailing factory hours—by interfering with adult labour—by excise duties, the latter could be crushed, then the hand-loom industry would be entirely at their mercy: nothing could possibly save it from rapid extinction.

If therefore the hours of labour in India were restricted so that the output of the labourer out here were made to be even less than it now is, it is obvious the factor of the value of the raw material would be a diminishing one: the point would be reached when the saving in cost of manufacture would more than cover the difference in cost of raw material, then what would happen? Your industries must disappear. If cotton yarns and cloths could be landed in India for less than they would be spun and made here, do you think cotton spinning or power-loom or hand-loom weaving could continue to exist in India? They would disappear like the morning mist..

In interfering with the hours of factory labour in India, I am afraid, Lancashire lays itself open to the charge of having one object, one aim, and that is to destroy India's cotton industry.

These therefore are what we have to bear in mind in developing or endeavouring to develop India's industries. There is first the disability we are under of having poor labour; until we make the Indian labourer a more intelligent and better workman than he now is, we will never be able to compete with European nations.

And there is second the danger of such interference by outsiders with our labour laws as will enhance the cost of our manufactures, and thus bring our markets within easier reach of the skill of Western nations.

POWER-LOOM MILLS AND HAND-LOOMS.

By E. B. HAVELI, Esq., *Principal, School of Art, Calcutta.*

Among the proposals for meeting the present increased demand for country-made cloths, I have noticed one which has been strongly advocated, namely, to start cotton-mills, *i. e.*, mills for weaving cloth by power-looms. I hardly think that those who make this suggestion have realised the economic and industrial bearings of the problem they attempt to solve. If the profitable working of power-loom mills in India were merely a question of obtaining the capital required for starting them, it is quite certain that, long before the present movement began, there would have been enough mills in India to meet the whole demand for the Indian textile trade, and the great hand-loom industry which now exists would have been practically extinct. The fact that, after fifty years of competition with Indian power-loom mills, hand-loom weaving is still by far the most important of Indian industries (excluding agriculture) is sufficient to show how totally different are industrial conditions in India to those which obtain in Europe.

For a good many years I have been endeavouring to show that as long as these conditions last it is possible for hand-

loom weavers in India to more than hold their own against power-loom mills, if only they are provided with proper hand-apparatus and proper instruction. If this is the fact the only sound policy is to develope to the utmost the hand-loom industry and not to divert any of the funds, which might be devoted to that purpose, towards promoting in India a system based entirely on European industrial conditions. No one can maintain that these conditions are an improvement on those which obtain in India from a humanitarian point of view. It is beyond dispute that the work in modern power-loom factories is physically, morally and intellectually degrading.

The number of hand-loom weavers in Bengal is estimated at about 400,000. The present demand for country-made fabrics will soon largely increase this number, for many weavers who have taken up other occupations are now returning to their looms. The number of persons benefited by improvements in hand-loom weaving is thus very large—power-loom factories only increase the wages of a very small number of workmen, at the expense of their physical, moral and intellectual well-being. By spending about ten rupees per loom on improved weaving and warping apparatus the 400,000 hand looms in Bengal can be made to double their outturn. This would cost about 40 lakhs. The same sum would not provide more than two or three fully equipped power-loom mills, which would not produce a twentieth of the amount which could be produced by 400,000 hand-looms. Again if Indian weaving mills can even now barely hold their own against the primitive unimproved native hand-loom, which is 150 years behind the times, where will their dividends be when the hand-loom weaver has doubled, trebled and quadrupled his present outturn, as he can do by the use of up-to-date hand-weaving apparatus? Some of the best engineering firms in Europe are now producing first-class hand-looms which nearly equal power-looms in speed. Messrs. Hattersley and Sons, Keightley, have already produced a special loom for weaving *saris* and *dhoties*. They have lately reduced the price of this to a remarkably

low figure. Messrs. Raffael Brothers, John Dalton Street, Manchester, who on my suggestion have been experimenting for some time with the object of producing a hand-loom especially adapted for Indian labour, inform me that they have now succeeded in perfecting a model which in point of lightness and easy working will satisfy all the requirements of Indian labour. It will, I understand, be placed on the market at the beginning of 1906. Many people in India, too, are now working at the same problem. The improvement of Indian hand-looms and other weaving appliances has now become the first industrial question of the day. It is making rapid progress all over India and it cannot be many years before power-loom mills, both in India and in Europe, will have to face a very much stronger competition than before. Under these circumstances I think the prudent investor would be well advised to leave power-loom weaving alone.

Capitalists with patriotic, philanthropic or other motives who wish to assist the Indian textile industry can find sound investments in three ways :—

1st,—In the manufacture of improved hand-weaving apparatus.

2nd,—In starting small hand-loom factories in suitable localities.

3rd,—In spinning mills.

With regard to the latter it is obvious that a prosperous hand-loom industry must be very much to the advantage of spinning mills, for as hand-loom weaving progresses the greater will be the demand for yarn, which cannot be made sufficiently cheap by the native hand-spinning apparatus. There is no immediate prospect of improvements being made in hand-spinning apparatus, similar to those which have been made in hand-weaving apparatus, to enable cheap Indian hand-labour to compete successfully with steam and electric power, though this is a question which might well be taken up.

The type of spinning mill most suitable for India would be one placed near the principal hand-loom weaving districts, which would spin yarn and supply prepared warps

direct to the hand-loom weavers in their houses, or direct to a number of small hand factories. It should also assist the weavers in getting improved apparatus, instruct them in the use of it, give facilities for repairs, buy up the finished cloth from the weavers and act as their distributing agent.

A combined scheme of this kind would be financially sound, and one against which no power-loom mills could compete. Some professed experts in industrial questions taking their stand on an assumed universal superiority of steam or electric power over hand-power, ridicule the idea of hand-looms competing successfully with power-looms. They, however, entirely overlook the fact that the manifest superiority of steam or electric power in works of great magnitude, such as the making of a 100-ton gun, does not apply to operations not exceeding the strength of an ordinary man. In the latter case, provided that the man uses efficient apparatus, which does not waste his strength, the one-man power in a human being is as good as the same power produced by steam or electricity and has the supreme advantage that is entirely under the control of human intelligence. The process of weaving belongs to this class of work. The power exerted in throwing the shuttle is the same whether steam or electricity or hand-power is employed. Any excess of power is not only useless, but causes loss of time and inferior work by breaking the thread in the shuttle. The question of economic superiority, therefore, lies not in the quantity of power which can be produced, but in the comparative cost of hand-power and mechanical power. In Europe the cost of mechanical power required for a loom is generally less, and therefore the power-loom has to a great extent driven the hand-loom out of the market. In India the cost of hand-power is less (provided that efficient apparatus is used), therefore the hand-loom can compete successfully with the power-loom so long as the rates of wages are not raised above the point at which the requisite mechanical power can be produced. Until India becomes a very much richer country than it is at present, this condition will not arise.

HAND-LOOM WEAVING IN INDIA.

BY RAO BAHADUR RAOJIBHAI PATEL, M. R. A. C., *Director of Agriculture and Industries, Baroda.*

1. Hand-loom weaving is the largest industry in India next to Agriculture and it is also the oldest. There is some difference in opinion as to which country or nation can claim the honour of inventing the art of weaving, but most probably, there was an independent development in every old country. The Indian hand-loom as it now is, is the same as it was some thirty centuries ago, and has still survived the competition of the power-loom. With the extension of rapid and cheap transit, however, which is bringing the products of power-loom to the remotest corners of India, the decline in the industry is rapid, and unless something is done to give it a fresh impetus, the Indian hand-loom will have to go the way of her more advanced sister of the West, before her formidable rival, the power loom. Hand-loom weavers in India are engaged in weaving cotton, silk, and woollen fabrics, but the cotton industry being the largest, requires our best and the first consideration, and that is the branch to which I shall confine myself in this paper.

2. It appears from the Census of 1901, that there are in all India about 27 lacs of hand-loom Numbers engaged. weavers of cotton fabrics, supporting an equal number of dependents. To what extent this number is decreased as compared to the number ten, twenty, or thirty years ago, is difficult to find. The headings in the census tables have been changed at each census. The number of hand-loom weavers as a class was never before separated, nor does the last census give their territorial distribution. It is, however, a patent fact, that the industry has been slowly but steadily declining, since the introduction of Manchester piece-goods into India. Taking the principal weaving castes in India.—

Name of weaver caste.	Province.	Strength in 1901.	Per cent. increase or decrease of general population compared to 1891.	Per cent. increase or decrease of weaver caste, compared to 1891.	Percentage of actual workers following traditional occupation.
Tanti and Tetwa	Bengal ...	9,46,463	+ 4	+ 18	38
Sali and Kosti	Bombay ...	1,41,052	- 2	+ 9	63
Koshti ...	Central Provinces ...	1,36,079	- 9	- 1½	73
Panka ...	Do. ...	1,37,855		- 15	27
Kilokan ...	Madras ...	*		*	59
Sali ...	Do. ...	3,25,912	+ 7	+ 5³	69
Julaha ...	United Provinces ...	9,23,042	+ 1½	+ 2¹	*
Kori ...	Do. ...	9,95,680		+ 7³	*
Julaha ...	Punjab ...	6,95,216	+ 7	+ 4	*

* Not available.

It appears that between 1891 and 1901, all the weaver castes have held their own in point of population, better even than others, excepting the Panka weavers of Central Provinces, who lost 15 per cent. against a general decrease in population of 9% on account of the famines. Curiously enough, this is the only caste in which all but 27 per cent. have left their ancestral art. The Bengal weavers are the next in order of renegades with 38 per cent., while nearly two-thirds of the weavers in Bombay, are still weavers, notwithstanding the strongest competition of local mills and foreign goods. The Kostis of the Central Provinces lead all other weavers, with 73 per cent. sticking to their traditional occupation.

3. To obtain an idea of the present production of the hand-looms is still more difficult. Mr. Production of hand- Robertson says in his Review of the looms.

Trade of India in 1904-05, that the production of cloth by the hand-weaving industry is probably double that of the Indian mills. The mill production of cloth is 15.87 crore lbs. or about 67 crore yards. At this rate the hand-loom production would be 31.74 crore lbs. or 134 crore yards.

The yarn imported into India is ... 2.75 crore lbs.
and the yarn produced by the Indian mills is, 57.84 crore lbs.

Making a total of	...	60.59 crore lbs.
Deducting the yarn exported and re-exported amounting to	...	25.01 crore lbs.

The yarn consumed annually in India is 35.58 crore lbs.

In parts of the country remote from the railway and markets, a certain amount of yarn is still spun by the wheel, but this may be taken as more than compensated for, by the amount of mill yarn put to uses other than weaving. On this computation Mr. Robertson's rough estimate seems fairly correct and the total cloth production of the hand-looms may be taken at not more than a hundred and fifty crore yards. This divided among the 27 lac weavers gives an average output of 555 yards per weaver per annum, or 5½ feet per day at 300 working days in the year. This seems such a miserable return that further inquiry into the subject seems necessary.

4. The import of cotton piece goods into India in 1904-05
Consumption of cloth. is 228 crore yards.

The mill production in	67	do.
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Total	...	295	do.
Deduct exports and re-exports	...	17	do.

This leaves for consumption	...	278	do.
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The total population is $29\frac{1}{2}$ crores, and allowing 15 yards per head per annum of cotton cloth, which would be a very fair average for a poor country like India, the total consumption would be $442\frac{1}{2}$ crore yards. The difference between this demand and the mill supply is $164\frac{1}{2}$ crore yards, the probable production of hand-looms. This calculation increases the average daily output by only six inches, and makes it a full fathom.

5. Let us now look into the Indian weaver's home and see if we can find a solution. The actual work of the weaver. The census tells us that among the weavers, there are half workers and half dependants. It also tells that there is an average of four in an Indian family, and we may fairly take it that the weaver is not an exception. Thus in a family of four, two are workers and two dependants. One of the two is at the loom, while the other winds thread on the shuttle bobbins, gives out the warp by parts when necessary, helps the weaver in drawing the warp threads through healds and reed, and attends to other odd jobs. The warping and sizing is usually done by warp makers and sizers, and the weaver weaves either for himself or for a merchant, technically called the putter out, who employs him. The drawing requires about $2\frac{1}{2}$ days of the weaver and his mate, and when the same class of pieces are to be woven one after another, a day and a half for twisting in. The warp is generally short, ranging from 18 to 50 yards according to the class of weaving, and on an average the time taken up in drawing is about a half of that taken in weaving. Calculating on this data we find that out of every two taken as actual workers, one alone weaves on the loom, and that one also, has to pass two-thirds of his time in weaving and one-third in drawing. Thus of every two weavers in the census, only $\frac{1}{3}$ of a person or $\frac{1}{3}$ of the whole number is at actual work on the loom. With the hand-loom making an average of 25 picks per minute, the daily production of a loom would range from about 3 yards to 10 according to the kind of cloth and would average about

6 yards. A third of this or 6 feet, is once again the daily output of cloth per person engaged in the industry.

6. I do not think that this should at all discourage us.

Prospective. Think for a moment of the 27 lacs of weavers, who have successfully withstood the competition of the power-loom notwithstanding this miserable output, and you will at once be convinced, not only that they will be hard to beat, but also, that any fresh impetus given to their industry, will once again make them even the masters of the situation. If we can but raise his average from 6 feet to 6 yds. or even to 5 yds. a day, we can make him strong enough to withstand competition and at the same time obtain an additional supply of cloth, even exceeding the total imports of India from Manchester. This, gentlemen. I understand to be the intention of this Conference. Most of us probably believe, as I myself did a few months ago, that when we have increased the working speed of the hand-loom to 80 or a 100 picks per minute, we shall have done all that is needed for this consummation. That I am afraid will be only partially true, as I shall shew you by an example, and by taking you deeper into the web of the weaving business.

7. The English hand-loom before 1738 was almost exactly like the Indian hand-loom of Fly-shuttle in England. to-day. It had just the same three motions of shedding, picking and putting the west in place, performed in the same way. The two feet raised the heddles alternately, to form a shed in the warp, one hand threw the shuttle with the west thread through, and being disengaged, gave a slight blow with the reed-sley to put the west in position. The other hand caught the shuttle emerging on the other side, and as soon as a shed was formed again, it did from that side what the other hand did before. This alternation of hands, both with the shuttle and the reed, took a lot of time, and the average work was 25 picks a minute, the same as in the Indian hand-loom. In 1738 John Kay invented the fly-shuttle. The alternation of hands was stopped and one hand gave motion to the shuttle, while

the other stuck to the reed. This simple invention more than doubled the work and raised the number of picks per minute to 60. A very curious result followed :—Paradoxical though it may appear, this improvement in the hand-loom killed the industry. The accelerated hand-loom required larger quantities of yarn and spinning machines were invented to meet the demand. The yarn production soon overtook and left the looms behind, and power-loom was invented to consume the excess of yarn. It was found, however, that preparatory processes of warping, sizing, etc., were too slow, and the power-loom did not make much headway in production, notwithstanding the enormous increase in the number of picks. Winding machines for warp and shuttle bobbins, and warping, beaming and sizing machines were next invented to take full advantage of the power-loom, and this put an end to the hand-loom. The invention of the fly-shuttle thus killed the hand-loom industry, but gave England a still higher form of textile industry, and the loss has really proved an enormous gain to the country.

8. In India the conditions are somewhat different, and I believe we can find ways, both to Fly-shuttle in India. make the hand-loom more productive and to give the weaver its full benefit. To find how this can be done, we shall have to enquire in some detail into the whole course, from the yarn to the finished cloth. We shall take it for granted that the weaver has got a simple contrivance, by the addition of which to his loom he can work at the rate of 100 to 120 picks per minute. If he is weaving a cloth, say four feet wide, in one minute he will use up 160 yards of west, and he will have to change the shuttle bobbin every minute and a half. This will take about 15 seconds or one-sixth of his working time, unless there is some one to keep his shuttles ready filled. The number of bobbins required in a day will be so large, that a woman working with the ordinary wheel will not be able to supply them, and a small hand machine for this purpose will be an absolute necessity, if full advantage is to be taken

of the loom. The warp, as is now made, will run out in a short time, and the weaver will have to give more time to drawing in, than to weaving. Larger warps equal to about 200 to 300 yards will be required and these cannot be made by the peg system. This will require hand warping machines, with winding and beaming machinery. The present system of sizing by stretching the warps and brushing in the size, will not avail, and some sort of sizing machines will also be necessary.

9. Assuming then that some contrivance is found by which the number of picks per minute Development of the industry. in the hand-loom is increased, say four times, the industry will naturally divide into four sections:—

- (1) *Warping*—This will be done by central factories, generally with hand winding and warping machines. The owners will either buy their own yarn and sell the warps, or simply warp the yarn supplied by the weavers and charge for the labour.
- (2) *Beaming*—To beam long warps by hand is very difficult and the work is generally uneven. Beaming by hand machines will be the next work, that can either be done independently or in connection with warping.
- (3) *Sizing* will also have to be done either in an independent small establishment or it may be combined with the warping and beaming in places where the number of looms is large. In this last case, a small factory using steam and working with steam machinery, will probably be the best arrangement.
- (4) The fourth and last section of the industry will be the weaving proper.

The recent Universities Act is sure to create a large army of half-educated young men of moderate means, and some of these, would find the founding and working of such small village factories one of the best things that they can do. With such small concerns, aiming at moderate profits, planted throughout the weaving centres to help him, and with

a loom giving him more than half the outturn of a power-loom, the Indian weaver can hold his own against the power-loom for generations to come; In fact, until such time as most of these small concerns, by growing bigger and bigger, get converted into veritable power-loom mills. I have left the yarn out of consideration, as that can be imported instead of the cloth, till the increase of spindles in the country produces enough for our needs. This, gentlemen, is neither a dream, nor too glowing a picture of the coming millennium. I can assure you that it is coming within a measurable distance of time. Four causes are working strongly towards it:—

- (1) Trials in all parts of the country to improve the hand-loom.
- (2) The Universities Act.
- (3) The interest the educated classes are taking in the development of industries, as witness the Exhibitions and this Conference.
- (4) And last, though not the least, the spirit which is taking a firm hold on the masses all over the country, I mean, the Swadeshi spirit.

10. The *Indian Textile Journal* writing about the hand-looms at the Bombay Exhibition,

The kind of loom required. says:—"The improvement in the Indian hand-loom is a matter of great urgency.

An enormous number of good looms is required, but a new design of general utility would seem to demand the combined ability of several experienced weavers and inventors. The object of the inventors should be to ascertain the best possible working speed in picks per minute of the average weaver, and then to adapt the mechanism of the loom to withstand this strain of work." This is excellent advice. Whether the new loom be worked by the feet alone or by both hands and feet, a weaver will not on an average, be able to move them more than twice in a second, and when it is considered that the shuttle has to travel the width of the loom between each pick, this speed seems to be the highest that may be attempted. One hundred to 120 picks

per minute for cloths ranging from 50 to 24 inches in width respectively, seems to me to be the best average speed attainable for a loom of general utility.

11. At the desire of His Highness the Maharaja Gaekwar of Baroda, I collected many of the improved hand-looms available in India, present. with a view to select the most suitable one for general introduction, among the weavers in the State, and I take this opportunity to note here my conclusions, which were drawn after a careful examination, and consultation with experienced weavers. The Hattersley automatic loom was found to be the fastest of those that were tried, but its complicated construction, rather heavy working and its prohibitive price are against its general adoption. The same remarks would almost apply to the Japanese loom, which is less automatic in working, and consequently less complicated in construction. The Churchill loom of Ahmednager is only a coarse calico-loom, working freely at 100 to 125 picks per minute, and is perhaps, the best loom designed for the kind of cloth for which it is intended. But its present price is heavy for the class of work it turns out. Most of the other improved hand-looms in the market, are slight variations of the ordinary fly-shuttle loom, and they are good general purpose looms, but their working speed is only 60 picks. Mr. Havell's Serampore loom is probably the cheapest of this type.

12. Unless I am greatly mistaken, the problem of the What is wanted. loom is still open, and it may be stated thus for intending inventors :—

- (1) Wanted, for the village weaver, a special attachment, by the addition of which to his existing loom, he can increase its working speed to 100 picks per minute. The cost of this attachment not to exceed Rs. 20 and the parts easy of repair by the village carpenter.
- (2) Wanted, for hand-loom factories and for well-to-do weavers, a loom, making 100 to 120 picks per minute and providing a simple arrangement, to

control the picks per inch in the cloth. The construction to be as simple as possible and the parts should be easy of repair by town mechanics. The cost of the complete loom should not exceed Rs. 100.

- (3) Wanted, for the full development of the industry, hand adaptations of winding machines for warps and shuttle bobbins and of warping, beaming, and sizing machinery.

These are the three chief problems to be solved. With the co-operation of a weaver, I have tried to solve the problem of the village loom, and the result is exhibited as the Sayajee Cottage Loom in this Exhibition, but I have no doubt that some one better fitted for the work, will work out a still better solution in time. I commend these problems to the earnest attention of all interested in the regeneration of the industries of India and the material progress of their country. Their solution requires the special efforts of a few brains and when they are solved, the Swadeshi spirit and the educated young men without work will do the rest to bring about the weaver's millennium.

A FEW WORDS ON THE ART OF HAND-LOOM WEAVING.

By S. P. KELKAR, Esq., *Bangalore.*

First inventors—The highest stage to which the art had reached—
The importance of the hand-loom weaver's appliances—How to improve our looms—My humble attempt in this direction—
Expert opinion to be secured—Exhibition of approved looms.

Some writers say that the art of weaving was first invented by the Egyptians. Some give the First inventors. credit to us Indians for first finding out the means and appliances of weaving, while some say that the Chinese were the first to weave a piece of cloth. I

do not wish to enter into a discussion of this point. I only say this much, that weaving of cloth was known to our people, even before the Vedas were composed by our Rishis, as in several places in those works mention is made of cloth, plain as well as of different colours.

Everybody knows that cloth of different varieties was

The highest stage
to which the art had
reached. exported to Europe and other parts
of the world in large quantities. The
excellence of the celebrated Dacca
muslin has been acknowledged by all. Though it is a painful fact that it has disappeared from this country, yet, no other country has been able to produce such fine cloth either by hand or by the present best mechanical means.

The tools and appliances used by our weavers are so

The importance of the
hand-loom weaver's ap-
pliances. simple that the total cost of all of
them is not more than rupees ten or
twelve. But by such means alone
our weavers weave the best sort of cloths, and this very
simplicity of those contrivances is a barrier in the way of
our properly appreciating the importance of these simple but
very ingenious inventions. We call our weavers ignorant
and their appliances quite primitive, and some go the length
of thinking them now almost useless. It is true that when
they were once able enough to weave cloth of the finest
texture, they stopped there and did not make further im-
provements in their method, but this must not be allowed to
lessen the value of their first inventions. To understand
the real merits of their ways and means I beg to suggest an
undisputable test. Let any one of very keen intellect,
one who has received the best University education and
obtained some double degrees, take some yarn and try to
produce a yard of cloth of even middling quality without
any help from any weavers or without using any of their
tools, and if he succeeds in his undertaking in two or three
years, I shall very readily confess that I was quite mistaken
in my estimation of the importance we should attach to our
weavers' appliances. But though I am quite prepared to
undergo such humiliation, I do not think there will be an

occasion for me to be in that position. Though the methods of our weavers are so simple, still if we go to see what processes the yarn they take for their cloth has to pass through and the different contrivances they use, we will see that they must have taken a long, long time to find out all the means which now appear to be so simple. It is the experience of all inventors that a very small thing sometimes takes years together to suggest itself to the man who tries for it.

In the weaving of cloth, the preparation of warp is an item of great importance. First the weaver has to arrange a large number of threads sometimes numbering to seven or eight thousand, but generally to two or three thousand. They are to be put very close and all parallel to one another. They are to be strengthened by the application of some paste. Then they are to be drawn through a net work of strong threads called *ruj* or *bai* known in English by the name of healds and a comb called *fani* or reed. After this the warp goes to the loom where the weaver puts the cross threads by means of a shuttle. These healds, reed, and a shuttle are the most important parts and their inventors must have taken many years at least to bring them to their present condition. Without these three parts weaving of cloth either with hand or by any improved mechanism is impossible. The looms used in England before the fly-shuttle loom was invented here, were just like our looms; several things being borrowed from our weavers by English agents sent for the purpose. And though the hand-looms have been superseded by the fly-shuttle ones and they also were in their turn put in the background by the power-looms, the chief parts mentioned above, namely, the healds, reed, and the shuttle are asserting their importance yet, even in the looms of the latest improved type. Any loom worked by any power have these parts.

Having given our hand-loom and its principal parts the credit they deserve, let us consider How to improve our looms. their present condition and the means for their improvement. At present our

looms have to compete with the power-looms, that is, with looms that are worked at a very fast speed. Among looms I mean to include the preparatory apparatus also. Many people who have given some little attention to this subject, appear to think that the looms of our weavers alone require improvement, leaving the preparation of warp aside or neglecting it altogether. The offers of certain medals for improved looms only explains this fact. But to improve our weaving industry, practically, the preparatory appliances as well as our looms will have to be improved. And the art of dyeing also will require our best attention.

To compete with the power-looms of other countries we must use the same machinery to ensure success. The hand-looms or the fly-shuttle looms even cannot do that. If power-looms be taken as railway trains, the fly-shuttle will have to be considered as a horse-carriage, and the hand-looms as bullock carts. Where railways are in use, horse or bullock carriages cannot compete. So old hand-looms or the improved fly-shuttle ones cannot stand before the power-looms. But as railway trains by their gigantic speed itself cannot go to every nook and corner and must leave ample room for horse or bullock carriages, so the power-loom being unable to weave every variety of cloth with profit on account of its fast speed, the fly-shuttle looms and even the old looms have their own fields. The silk-bordered *sarrees* woven at Maheshwar in Central India or at Burhanpore and Nagpur in the Central Provinces and in several other towns in other parts will have to be woven on the hand-looms for a long time to come at any rate. The fly-shuttle may some day conquer that province, but it is almost impossible for the power-looms to do that. They are for so many years in the field, but they could not make an attempt with any success. The same is the case with the fly-shuttle looms. Though they cannot take the place of the power-looms they have their own field. There are several varieties of cloth still manufactured by hand-loom weavers, but owing to the larger cost of production their sale is limited. But if the necessary improvement be made in the preparation of the

warp and fly-shuttle looms be used for weaving them, the cost of production of cloth would be much reduced and a readier sale for it insured.

The sole object of my visit to Europe was to complete my scheme of using improved machinery

My humble attempt in this direction. for the preparation of warp. By the use of two English machines for the

first two processes of winding and warping and the third machine designed and constructed by me and approved by several experts for the third process of sizing the warp, I am sure the cost of the preparation of warp will be much reduced. With the help of such improved methods the fly-shuttle hand-looms also have much chance of success. At least they will help us a great deal till we are able to start power-loom mills all over the country to supply all our wants so far as clothing is concerned.

There are now several improved looms before the public to be worked by hand-power. The Merits and demerits of the new different looms. question is often asked as to the relative merits of all these looms, and a word on this point will not be out of place.

The Domestic loom of Hattersley has been for a long time before the public and many have given it a trial. Motion to all the parts in this loom is given by feet alone, and added to this the weight of the material—cast iron—of which it is made makes it impossible for our weavers or any man of ordinary strength to work on it for some time. Besides it is suited only to narrow cloth. For these reasons and on account of its high price it has not become popular to any extent. The Japanese loom also has the same disadvantages though it is partly made of timber and partly of iron. This also is worked by feet alone and is suited to only narrow cloth. Mr. Churchill's loom at Ahmednagar is worked by both hands and feet like an ordinary fly-shuttle loom, and it has a better chance of success. In the process of weaving, (1) division of warp, (2) throwing of shuttle, and (3) beating of the sley are the principal operations. In a fly-shuttle loom, the first is done alternately by each foot, the second

by the right hand, and the third by the left hand. In the Ahamednagar loom the first is done by feet alternately, but the second and the third are done by both the hands applied to the sley together. I think to use one organ at a time as is done in the fly-shuttle is more favourable for constant work than to use any one organ for the whole work or to apply any two simultaneously. Let practical experience, however, decide the point.

It will be very useful to the general public if all the looms and the other apparatus connected with the work, be properly examined by experts and their merits

Expert opinion to be secured.
or demerits made known. Many people are anxious to start some looms for the manufacture of cloth, and they do not know what loom to buy. If no such help will be forthcoming, many people will have to be disappointed by using costly but comparatively useless things. Some such guidance as mentioned above is necessary.

After such examination another step will be necessary to make these new looms popular amongst the weavers. Good looms and other machinery connected with them will

Exhibition of approved looms in different parts.
have to be exhibited in different places, and their working shown to the people. Our people are very slow to adopt anything new, and unless steps are taken to bring to the notice of our weavers the advantages of the new plant they will not adopt them in their trade. Their extreme poverty is another drawback and to overcome that, well-to-do people will have to come to their help.

I was asked to write a short note on hand-loom weaving and the time that was at my disposal was very limited. So I have tried to put only such suggestions as I thought quite necessary at this juncture. I hope they will be found useful, to a little extent at least, to my countrymen.

HAND MECHANISM : A PRACTICAL SUGGESTION.

BY SIR HENRY COTTON, K. C. S. I., *Late Chief
Commissioner of Assam.*

If it is true that indigenous manufactures, and especially cotton goods, have been paralysed by foreign and Manchester competition, what is the most practical remedy to which we must look ? The difficulties are great in every direction. It is impossible that in these few words I can do more than touch on the fringe of these difficulties. But great as they are they are not insuperable, and I will offer a few suggestions on one point. It is to labour-saving appliances, to the action of machinery, that we must look for any considerable advancement in technical skill. But what sort of machinery ? It will be long before the people of India are in a position to provide the capital or combination necessary for the establishment of manufacturing industries on a large scale. That time will come, but meanwhile there are few opportunities for the development of large factories after the British model. The cotton mill industry in Bombay affords us encouragement and there are a few cotton mills in other parts of India, but their growth and expansion depend upon a larger application of individual capital than is now available. Gradual progress will assuredly be made in this direction. But I do not expect it to be rapid. There is substantial foundation for the charge of wasted capital, but even with more capital employed in remunerative enterprise, progress will be slow. The question hinges in a large measure on the habit, character and training of the industrial classes. The workmen of India are in the habit of depending upon their own small capital and have never been accustomed to work under large capitalists for bare wages after the manner of European mechanics. The immediate problem therefore which we have to face is the encouragement of sufficiently simple machinery among the masses of the industrial community. We want to improve the common spinning-wheel, the shuttle and the

hand-loom. I recall what was done by Messrs. Thomson and Mylne in their well-known patent for sugar-crushing mills. The inventor made a fortune out of this patent but the people of the country gained greatly by the invention. Can nothing on similar lines be devised for the improvement of the present simple spinning apparatus, something which by the aid of hand-machinery might double the daily outturn of a weaver's work? That is a practical suggestion I have to offer. There is a fortune, I believe, to be made out of it. But patriotic Indians will not look at the suggestion from that point of view. Let the landholders' associations, or benevolent individuals offer prizes or any reasonable encouragement for the discovery of such a cheap and simple mechanism, and I cannot doubt that it will readily be found. It does not seem necessary to go to England for such a purpose. There is surely enough mechanical inventive skill in India itself which would supply all requirements at a very small cost, and there must be many wealthy benefactors of their countrymen who would be willing to supplement the outlay from their own funds and so place the invention in the hands of those who could not otherwise afford it.

SOME GENERAL OBSERVATIONS.

BY DIWAN BAHADUR R. RAGOONATH ROW, KUMBAKONAM.

God has blessed us with keen intellect. He has given us the best of religions. Its commandments require us to discharge our duties to self, to fellow-creatures and to God. We are asked to do everything to improve knowledge and secure real happiness. God has given us a magnificent sun, fertile soil, mines of precious stones and metals and large rivers which bring down to our cultivation its life and prosperity. These made our forefathers the famous people of the world. Our monarchs were great warriors, possessed of immense wealth, just judges, receivers of moderate

taxes and fathers of the people. Our Rishis were depositaries of knowledge, both profane and sacred, universally kind and forgiving and great instructors of sciences and religion. Our merchants traded with all the known parts of the globe and used to be found in several parts of the Greecian and Roman Empires. They crossed the sea, conveyed the surplus productions of the Jumboo-Dwipa to the provinces of these Empires and brought from them what they produced. At home they cultivated the lands, owned domestic cattle and carried on local trades. They encouraged our industries. Thus Bharata-Varsha flourished from time immemorial to many thousands of years.

How are we now situated ? Happily we are placed under a benign Emperor as good as our Manu of the Krita-yuga. His people who wield immense political power in the administration of the countries under him, are our good friends and always wish to make us as happy as possible.

Yet, we are poor and unhappy. Why so, is a question well worthy of consideration by all who wish well of Bharata-Varsha. The main causes of our unhappiness are that our Rishis have disappeared, our commerce has degenerated, our Agriculture has been neglected and handicapped, our industries have been ruined, our taste for foreign articles has increased and their non-substantialities are not thought of, and the prudence and forethought of merchants have disappeared. They export what they should keep in the country and import non-substantial articles which we need not purchase from other countries, but can produce in our own country. We can still produce more corn than we want for our consumption. We can produce cotton and secure wool from which we can make sufficient clothing to clothe ourselves and people in other countries. We can cultivate and obtain cotton of the finest staple as good as that of Dacca of olden times. We can manufacture fine and coarse woollen cloths. We were fine architects. Our temples' towers are still admired. Our hardwares and our jewels excite admiration. We have coal, diamond, gold, stones, sphatika, etc. Yet, we do not utilize them. Our artisans

starve, our weavers die in thousands in famine. Knowledge used to be imparted by our Rishis and the enterprise of our merchants not being now in existence, we have been subject to these misfortunes. We should revive the knowledge of our arts and sciences, improve our agriculture, encourage our industries, love our productions and should not be beguiled by the apparent superiority of foreign goods. We should select our instructors, unite to follow them, acknowledge their authority, submit to their discipline and trust and follow them. No army, however numerous, can obtain victory without a general. In our successful days, we had heads for every department of our business. We obeyed them and conquered the world. We can do the same under similar circumstances.

What we should now do is :—

- (1). Improve agriculture by all the appliances both ancient and modern and produce more food than now.
- (2). Reserve a sufficient quantity for our use in the next two or three seasons, lest they may prove unsavourable.
- (3) Export the remainder.
- (4). Implore our rulers for aid if their aid is absolutely necessary for carrying out the aforesaid measures.
- (5). Improve the cultivation of cotton in extent and quality, to compete with cottons of modern countries.
- (6). Combine and form companies for the manufacture of threads and cloths from cotton and from wool.
- (7). Work mines in different parts of our country.
- (8). Utilize all appliances available for the development of our numerous industries, helping the growing population of our country to earn their livelihood.
- (9). Revive our old love for truth, bravery, industry, respect for our religion and kindness to our fellow-men.
- (10). Give up bad and ruinous habits which have crept into our society.
- (11). Become physically strong, active, enduring, morally great and religiously good, taking for our model the ancestors of our forefathers.

(12). Continue loyal, as we have always been, to our Sovereign, thankful to our brethren who wish well of us and dutiful to the great Sovereign of the Sovereigns, the Creator of the universe,

May He inspire us to make ourselves what we were when He once chose us to be so!

EDUCATION AND INDUSTRIAL DEVELOPMENT.

BY RAO BAHADUR R. N. MUDHOLKAR, B.A., LL.B.,
Advocate, Amraoti.

The object of this paper is to deal with education as it bears on industrial development and to consider it in relation to the conditions obtaining in India. In a speech delivered by H. R. H the Prince of Wales some two years ago on his return from a tour to the colonies, he exhorted the British nation to "wake up" to the exigencies of its present situation, and to brace itself for the keen struggle of competition with the other advanced nations in the field of industrialism, by a proper system of national education. England still occupies a pre-eminent position amongst the progressive nations of the world as a manufacturing and exporting country: she is still one of the richest countries—if not the richest country: in the preparation of textile fabrics and machinery she continues to lead in the van. But because her supremacy is threatened, and other nations, who only a generation ago were far behind her, are now coming up close to her, her leaders are urging her to quicken her pace and to strengthen and qualify herself for effecting this object. If such admonition, if this waking up, is found necessary for England, how much more imperative is it in the case of India? With all her vast natural resources, her advantages of climate, soil and situation, a sober, thrifty and industrious population, India is one of the poorest countries in the world. While England has an annual average income of £45 per head, India has an income of only £2, and this according to the

most optimistic calculation. Things were not so always. Not many generations have passed since the fame of India's riches and the superior qualities of her manufactures attracted foreign nations from afar to her shores. The country, however, whose finely woven fabrics used to go by ship-loads to Europe, is now dependent upon others for the supply of the greater part of the cloth which is needed by her own children for their every-day wear. From an exporting and manufacturing nation we have become an importing and agricultural one. Possessing the raw materials of manufacture, instead of being able to prepare the requisite finished articles ourselves, we send out these raw materials to other countries and depend upon them to give to them the shape which would fit them for our use. It is a fact admitted by all well-informed persons that the present poverty of the Indian people is in the main due to the decline of her manufactures and the decadence of her old industrial system. The report of the First Famine Commission of 1880 explicitly points out that the phenomenon of ever recurring famines is due to the disappearance of the industries which maintained in former times a considerable portion of the population and to over four-fifths of them being thrown entirely on land. The escape of the country from this deplorable condition depends upon the revival and rehabilitation of that varied industrial system, which enabled her in former times, in spite of foreign invasions, internal unrest and political upheavals, not only to supply all the wants of her children, to give them "home made" all the things which minister to the comforts and conveniences of civilised life, but to send enormous quantities abroad and acquire riches thereby. The industrial question in India is a question of life and death. Not only the progress, but the very existence, of the nation depends upon the establishment of a diversity of occupations which will remove the pressure on the land and enable a substantial portion of the population to earn their livelihood otherwise than by precarious agriculture.

It is foreign to the purposes of this paper to go into the political causes which brought about the present situation.

Accepting facts as we find them, it has to be considered whether it is feasible to remedy the present state of things and to establish and develop industries in India. The consideration of this problem is facilitated by the fact that there were other countries which were in a manner reduced to the same predicament as ours and which have now achieved their salvation.

The close of the Napoleonic wars found the countries on the continent of Europe reduced to a very low state with their resources exhausted, their population diminished, their manufactures dead or decayed. In many states agriculture was the only source of income left. England was the one country the manufactures and trade of which were in a flourishing condition. The working classes were, indeed, undergoing extraordinary privations on account of high taxation, an unsound financial and economic policy, and by the dislocation of business caused by the substitution of machinery for manual labour. But the country, as a whole, occupied a post of vantage. The labours and discoveries of Arkwright, Watt, and Crompton had given an impetus to her manufactures which secured for her a commanding position. For many years after the peace she retained almost exclusive possession of the improved machinery employed in the cotton, woollen and linen manufactures. The continental countries found barriers placed in the path of their progress by regulations which rendered penal the enlistment of skilled English artisans for employment abroad, by prohibitive tariffs which either forbade the import into England of foreign-made goods or imposed high duties on them. The export of spinning machinery to foreign countries was prohibited until after the accession of the late Queen Victoria. To effect freedom from dependence on England these countries set about systematically. To facilitate the introduction of the improved methods and appliances on which the supremacy of English industries rested, they established a carefully worked out and elaborated system of national education—general and scientific—and by raising to a high level the general knowledge of the peoples and their

scientific acquirements, they not only succeeded in effecting their emancipation, but have carried their technical efficiency so high as to compete with England on terms of equality in neutral markets. It is true that Germany and some other countries give adventitious aids to their manufacturers by a system of close protection and bounties. But neither protective tariffs nor bounties would have been of any avail without the almost universally prevailing high standard of general education and the extraordinary cultivation of the mechanical, physical and chemical sciences—theroetical and applied. New industries like those of sugar prepared from beet, or aniline dyes prepared by synthetic process, have been created and are obtaining ascendency everywhere. It was the labours of M. Pasteur who applied his scientific researches to purposes of trade that preserved the silk industry and the wine industry of France from the destruction with which they were at one time threatened. France, Germany, Holland, Switzerland, not only prepared articles of merchandise from raw materials available in those countries or brought from abroad, but they prepared their own machinery for turning out these goods. German and French machinery is prepared both for use at home and for export abroad. All this is due to education and education of the proper kind. The case of America is even more remarkable. Fifty years ago the United States of America were, as compared to England, hardly anywhere in the field of industry. The advance they have now made is so great as to produce alarm in England itself. The reports of Mr. Mather in 1884 and of Mr. Moseley's Commission in 1903 demonstrate that the extraordinary strides which all industries have made in America are due to the spread of education—general and scientific. Probably nothing should be more convincing to the Eastern mind than the achievements of Japan. As Mr. Alfred Stead says, "In the history of the world there has been no such wonderful development in so short a space of time as that of Japan." Roused from her slumber of centuries by the visit in 1853 of the American men-of-war under Commodore Perry, Japan found that she was nowhere

in the scale of nations and that if she was to maintain her independent existence, she must bring herself in a line with the countries of Western Europe, and raise herself to their standard of efficiency. An almost purely agricultural country only fifty years ago, she is now one of the most active and powerful in the field of industrialism; and this position she has attained by the establishment of a most carefully thought out system of national education. The progress of Japan in arts, industries and trade is specially instructive as she was not, on account of the peculiar circumstances under which she was placed, at liberty to invoke the aid of protective tariffs.

In the countries of the Western continents it is now an accepted axiom that there is very close connection between education and the progress of industries and trade. In India the importance of this great truth has yet to be carried home to the people. Even among persons deemed to be educated there is often displayed a latent scepticism about the importance of education in securing industrial development. Half instructed persons indulge in sneers about the unsuitability of education in promoting crafts and trade. Indeed some minds still hug to the exploded notion that science and art have no connection with each other and that education unfits a man for industrial pursuits.

The Report of the Royal Commission of 1884 on Technical Education contains the acknowledgment that even at that time the continental manufacturers displayed the remarkable development of their material resources which had been effected by those countries and that industrial establishments in France, in Germany, in Belgium and in Switzerland had attained as much perfection as those in England. "Much machinery of all kinds," say they, "is now produced abroad equal in finish and in efficiency to that of this country and we found it in numerous instances applied to manufactures with as great skill and intelligence as with us." England had the start of them by over sixty years, and the Royal Commissioners state that within less than fifty years Germany had made such progress as unquestionably to have

taken the lead in some branches of industry, more especially those requiring an intimate acquaintance with organic chemistry.

It is not possible to state within the limits of a paper like the present what the study and cultivation of natural science has done to create and develop industries. Even before the discovery that Steam and Electricity can be made to subserve to the wants of man, considerable advance had been made by the application of mechanics to industrial operations. The spinning jenny and the spinning frame, the utilisation of water and wind power, might be mentioned as instances. This substitution of machinery and of natural agents for hand labour which began a hundred and fifty years ago, has been proceeding by leaps and bounds. Steam has been harnessed now, annihilating toil and abridging time and space in a way truly marvellous. The conquest made by steam and its general role in processes of production and distribution are now obvious even to the Indian rustic. But all the same it has to be impressed upon our people over and over again that unless modern inventions and recently discovered scientific truths be brought to constitute essential factors in the development of Indian industries, Indian productions will never be able to hold their own in the markets of the world except in a very limited extent as curiosities. The general cry is that the latent natural resources of the country ought to be utilised, that the numerous raw materials of manufactures like cotton, linseed, hides and skins, which leave the country every year to the value of 40 or 50 crores of rupees, ought to be turned into finished articles of trade in the country. But this is only possible if we adopt the processes and methods by which the Western nations have brought about a diminution of the cost of production.

It is not to be supposed that it is meant that the mere study of the Natural Sciences and knowledge of the methods of their application to industrial purposes is sufficient for solving the economic problem. Capital is as great a *sine qua non* as knowledge, and moral grit is an equally essential

factor. But as matters stand, the motive power in achieving industrial progress is afforded by the applied sciences. Say the Royal Commissioners on Technical Education :—" In whatever degree the technical instruction of our continental rivals may have trained them for competition with ourselves, in their own, in neutral and to some extent in our home markets, much of their success is due to more painstaking, more pliancy and greater thrift; and also to the general cultivation, the knowledge of modern languages and of economic geography possessed by continental manufacturers."

The economy of labour, time and material effected with the help of scientific discoveries has brought within the means of ordinary persons articles of comfort, convenience and luxury which, only a hundred years ago, were available to the rich alone. Articles which never existed before have been brought into existence. The yield from land has been increased. Natural products which for ages remained unutilised, have been made available to the service of man. It must, in fairness, be admitted that even those who show scepticism about the importance of education in the furtherance of industrial progress, do not deny the significance of the only too palpably visible facts around them. The great value of the possession of high scientific knowledge and technical skill in the captains of industries is admitted. The importance of research is not denied. What has to be impressed in India is that education, both general and special, is imperatively needed not only by the commanders and superior officers of the Industrial army, but by the rank and file and the subordinate and non-commissioned officers also. The working man and the artisan whose brain has been developed, whose eye has been trained, and whose hand has acquired dexterity by the proper kind of general education, and who has grasped more or less the principles of the craft which he follows, the tools which he handles, and the materials he works upon, is a far more efficient workman than he who has only received the traditional training in the practice of his profession without any general or scientific education. A few men of genius might be able to accomplish

extraordinary results without the help of any *regular* instruction. It is not on such exceptional cases that rules applicable to the mass of ordinary persons can be laid down.

No better objective lesson of the effect produced upon national wealth by the development of the natural sciences and their application to practical pursuits, exists than the progress of the cotton industry in Europe. The cotton plant is indigenous to intertropical countries and its earliest home is India and the countries adjacent. While Europe was submerged in barbarism and ignorance, cotton manufacture in India had reached a very high state of perfection. Up to the end of the 18th century, it might be said, Europe was dependent for cotton goods on the Indian supply. In England the manufacture of cotton was established in the 17th century ; but little progress was made in obtaining hold even on the home market till the mechanical inventions of the latter quarter of the 18th century enabled English factory owners to get done by ten men, work which formerly required four or five hundred. The Indian manufacture did, it is true, maintain for some years an unequal combat against the products of the new power-driven machinery protected by high tariff walls. So late as 1814 the number of cotton pieces imported into Great Britain from the East Indies numbered 1,266,608 pieces, while British cotton manufactures exported to India measured only 818,208 yards or about 40,000 pieces. But the fight could not last long. The finely woven superior stuffs of Dacca and Masulipatam could for a considerable number of years, defy the competition of machinery ; but in the case of the cloth ordinarily worn by the middle classes, while the Indian stuffs could not be sold in England at the prices at which machine-made stuffs of the same kind could be sold, the latter began to flood the Indian bazaars and to drive the products of the hand-looms of India from their home markets. Within seven years of 1814 the number of cotton piece goods imported into Great Britain from the East fell down to 534,000 pieces, while British cotton manufactures exported to India rose up to over 19,000,000 yards. America is the other

country which was the home of the cotton plant. Till the end of the 18th century, America possessed no manufactures except for domestic production and family use. By the end of the Napoleonic wars we find that they have with their characteristic energy established mills which gave work to 70,000 people. But in spite of the fact that the finest cotton was grown in their own country, these mills could be kept working only by the protection afforded by tariff laws which imposed import duties of $16\frac{1}{2}$ and $27\frac{1}{2}$ per cent. on foreign goods. This protection against foreign competition served the useful purpose of increasing the manufacture. Power-loom works were everywhere erected in large numbers; the most approved processes both in spinning and weaving were adopted. After the close of the civil war we find that in 1869 the number of spindles was 6,763,000 and in 1875, 9,539,000. The continent of Europe shows a similar phenomenon. Dependent almost entirely first on the East Indies and then on England for the supply of cotton yarn and piece goods, it was only when they were in a position to establish and maintain factories worked with the aid of the latest scientific inventions that they could turn out the products required for home consumption. By 1875-76 Germany had 5,000,000 spindles, France the same number, Russia and Poland 2,500,000, while Switzerland and Austria had each between 1,500,000 to 2,000,000. The total number of spindles at work in the various manufacturing countries of continental Europe was in 1875 A. D. 19,440,000; and the number in Great Britain was 39,000,000. Thirty years ago, England was thus ahead of the whole continent of Europe and the United States of America put together. Since then the relative positions of these countries have been greatly altered. The table given below will show how during the last twenty years the consumption of cotton in the United Kingdom has increased only by 1,750,000 cwts., on the continent it has gone from 9.17 to 22.27 million cwts., and in the United States from 6.13 to 18.92 million cwts.

Period.	United Kingdom.	Continent.	United States.	Total.
1876-80 ...	11.20	9.17	6.13	26.50
1881-85 ...	12.88	11.76	7.66	32.30
1886-90 ...	13.75	13.98	9.05	36.78
1891-95 ...	14.11	17.02	11.26	42.39
1896-00 ...	15.05	20.11	14.03	49.22
1901 ...	14.32	21.30	15.80	51.42
1902 ...	15.07	22.10	17.83	55.00
1903 ...	13.90	23.69	16.53	54.12
1904 ...	13.99	22.27	18.92	55.18

Japan has the same tale to tell. At the restoration in 1867, Japan was practically an agricultural country, pure and simple. Even taxes were paid in rice. Judging properly the real sources of the power of the western nations, she was convinced that the establishment of an industrial system conducted on the latest and most advanced principles was necessary both from the political and economical point of view, she proceeded with the thoroughness characteristic of her to lay the foundation of her industrial greatness. In 1877 the total trade of Japan with foreign countries amounted to only 50,000,000 yen or about 4½ crores of rupees. In 1902 the value had risen to 530,000,000 yen. The writer of the article on "Commerce and Industries" in *Japan by the Japanese* states :—"In 1890-91, the weaving industry did not make any marked development and the value of goods woven was about 30 or 40 millions yen ; but recently aided by the pro-

gress of applied chemistry and also of technology, the industry has made considerable progress, and in 1899 the weaving capacity reached 150 millions yen. Now with the cotton yarn industry it has become one of the principal industries of the empire." The cotton spinning industry originated in 1880-81 and developed gradually, till in 1890 the number of spindles was 277,895; in 1901 the number went up to 1,181,762. Similar progress was made in the trade in silk tissues,—pure and mixed. In regard to mining, the writer just quoted says :—"Thanks to the progress of the art of mining, all branches of this industry have gradually developed in recent times, except sulphur and antimony."

The advantage conferred by the application of science to industrial purposes is manifest not only in manufactures, but is also apparent in agriculture. Wheat land in the North-West Provinces of India now gives an average yield of 840 lbs. an acre. For the whole of India the average yield of wheat per acre is 700 lbs. In England it is 1,700 lbs. The average yield of cotton per acre is 62 to 70 lbs. in India as against 200 lbs. in America. Rice is 800 lbs., as against 2,500 lbs. in Bavaria. To quote again from the Japanese writer : "Primitive methods have succeeded in the past because of the industry and sobriety of the people (Japanese) as a whole and because of lack of foreign competition; but with the desire to keep abreast of western farmers, or possibly to lead, the necessity of modern scientific agricultural knowledge has been recognised by the Imperial Government, and where put to practical test has resulted in increased production per acre."

The value of establishing industries in a country for preparing its raw materials into articles of commerce will be properly estimated when we consider facts like those disclosed in the table given below from the Report of the Tariff Commission, Volume II.

	Yarns (per lb.).			
	Raw cotton (per lb.).	All kinds.	Grey.	Bleached.
	<i>d.</i>	<i>d.</i>	<i>d.</i>	<i>d.</i>
1876-1880	6 $\frac{3}{8}$	12.82	...	...
1881-1885	5 $\frac{1}{4}$	12.28	...	...
1886-1890	5 $\frac{5}{8}$	11.05	10.53	13.42
1891-1895	4 $\frac{1}{4}$	9.94	9.52	12.05
1896-1900	4 $\frac{1}{8}$	9.75	9.45	11.16
1901-1904	5.24	...	11.13	11.65

Though England has to import cotton from America or from the East, the price of yarn is double that of the raw material. That of woven fabrics is considerably more. India exports cotton to the value of about 14 crores of rupees. She imports piece-goods of the value of 33 crores of rupees and yarn worth about 2 $\frac{1}{2}$ crores. What important addition would be made to the wages fund if we are able to prepare our own piece-goods? Raw hides and skins of the value of 8 crores and seeds of the value of 14 crores are exported. All these are capable of being turned into the articles of use prepared from them with the proper kind of appliances and scientific methods. Some years ago it was estimated by a competent authority that if India only worked up her raw materials, there would be an addition of from 50 to 60 crores to the wages fund and the profits on capital.

The explanation of the wonderful progress of the industries of Continental Europe is given by the Royal Commissioners on Technical Education. "Half a century ago when the countries of Continental Europe began to construct railways and to erect modern mills and mechanical workshops, they found themselves face to face with a full-grown

industrial organisation in England which was almost a sealed book to those who could not obtain access to its factories. To meet this state of things these countries established technical schools and sent engineers and men of science to England to prepare themselves for becoming teachers of technology in those schools."

Technical High Schools now exist in nearly every continental state, and are the recognised channel for the instruction of those who are intended to become the technical directors of industrial establishments. Many of the technical chemists have, however, been and are being trained in the German Universities. The Commissioners believe that the success which has attended the foundation of extensive manufacturing establishments, engineering shops and other works on the continent, could not have been achieved to its full extent in the face of many retarding influences, had it not been for the system of high technical instruction in these schools, for the facilities for carrying on original scientific investigation, and for the general appreciation of the value of that instruction and of original research which is felt in those countries. All these schools have been created and are maintained almost entirely at the expense of the several states, the fees of the students being so low as to constitute only a very small proportion of the total income. The buildings are palatial, the laboratories and museums are costly and extensive, and the staff of professors is so numerous as to admit of the utmost sub-division of the subject taught. The Commissioners were greatly impressed with the general intelligence and technical knowledge of the masters and managers of industrial establishments on the continent. They have found that these persons, as a rule, possess a sound knowledge of the sciences upon which their industry depends. They are familiar with every new scientific discovery of importance, and appreciate its applicability to their special industry. They adopt not only the inventions and improvements made in their own country, but also those of the world at large, thanks to their knowledge of foreign languages, and of the conditions of manufacture prevalent elsewhere.

Under the polytechnic schools come the technical schools for foremen. The theoretical instruction in these schools is similar in character, but inferior in degree to that of the great polytechnic schools. On the other hand considerable attention is devoted in these schools to practical instruction in laboratories and work-shops which is not the case in polytechnic schools.

Side by side with the general polytechnic schools are institutions for specialised instruction, such as weaving schools, miners' schools and schools for workers in iron and steel industries, &c., which are intended mainly for developing the qualities required in the foremen, managers and masters. Most of these schools in Germany are founded or maintained by the manufacturers. There are schools for giving the instruction requisite for those who enter the commercial and banking lines.

Numerous societies exist for the purpose of development of technical education among workmen and other persons engaged in industry, by means of lectures and by the establishment of schools and museums of technology. These associations are supported mainly by merchants, manufacturers and Chambers of Commerce.

The facilities which exist in England for what might be called the training of supervisors, directors, leaders and organizers of manufactures, trade and commerce, are said to be even ampler and of a superior type. But the one thing in which the continental educational system is superior to that in England is in regard to the provision for the education of workmen and artisans. Primary education is compulsory and every boy has to attend a school from the age of six till the age of fourteen. In some countries both primary and secondary education is free. And it is not only merely in reading, writing and simple rules of Arithmetic that instruction is given in elementary schools, but Drawing—both freehand and by measurement—and manual instruction form part of the curriculum. The greatest importance is attached to drawing as a training of the eye and as teaching exactness. Value is given to manual training as developing

dexterity of the hand. The possession of these qualities is considered as necessary for those who are intended to adopt literary pursuits as for those who go in for industries and art. The great importance of drawing and manual training is now recognised in England also.

The American system, while adopting the superior methods which are shown to be desirable and necessary by eminent educationists and practical men, and which the experience of the last two generations justifies, seeks to give them a still more practical turn. The aim of the American Universities in their departments of science and commerce is to turn out business men who are conversant with the theory of their respective callings.

The report of the Commission which under the initiative of Mr. Moseley visited America with the object of finding out how far the phenomenal development of American industry can be attributed to education—general and technical—reveals several most instructive facts. They state that the most flourishing mechanical and electrical establishments seek after the services of graduates. In fact the demand for scientific graduates exceeds the supply. It would be well to bear in mind, as the Commissioners point out, that in America there are one hundred and ten thousand graduates in every million of the population. The faith of the Americans in education, as the true basis and qualification for all useful pursuits and occupations, is so intense as to partake almost of religious fervour.

The great effort of all the leading Western nations is to train up the entire body of their citizens for the callings they may have to adopt in life. They have assimilated the grand truth that the object of education is not so much to stuff the head of the child and the youth with more or less diversified book lore, but to cultivate his faculties, to train his brain, eye and hand, to develop his reasoning powers, to stimulate observation and to encourage constructiveness. It is recognised to be a sacred duty of the State to devote its funds to the preparation for life of its juvenile and adolescent population. It is stated that some of the American

States devote nearly half their revenues to purposes of education.

The spread of education in the leading nations of the West will appear from the facts given below :—The total population of Germany was in 1900-1901, 56,367,000. The number of pupils in primary schools was 8 millions. The number of primary schools was 60,000 and of teachers 125,000. So far back as 1875 education was so widely spread that out of 139,855, the total recruits of that year, only 3,311 or 23·7 per thousand or 2/3rds per cent. were unable to read or write. In 1898-99 the number of persons recruited was 252,382 out of whom only 173 or 7 men out of ten thousand were returned as illiterate. The number of secondary schools—Classical and Real—is 1,076. Those in Prussia alone numbered 578 and contained about 148,500 pupils. There are 21 Universities in Germany which in 1898-99 had 33,500 scholars and 2,802 professors and teachers. Persons receiving higher technical education were 13,000. In addition to technical high schools there were three academies of mining and 8 of forestry and there are agricultural schools (of the status of our colleges), attached to several of the Universities.

In England with a population of $32\frac{1}{2}$ millions the average daily attendance in elementary schools was 4,666,000 in 1900. The secondary and higher schools and the universities have for generations been well attended. Their number has been largely increased and, what is more important, their modern and scientific side has been vastly developed. During the last 20 years technical instruction, secondary and higher, has made great progress and technical schools have been multiplied. The whole system of education is being overhauled and drawing, clay modelling, manual training in wood and metal and science teaching are becoming more and more an established part of the primary and secondary curriculum. Manchester spent three hundred thousand pounds, equal to forty-five lakhs of rupees, over her new technical school. The Leeds higher grade school, which has the three departments of (I) the classical or (professional), (II) the modern or mercantile, and (III)

the science or technical, has accommodation for over two thousand pupils. Manual instruction and workshop practice forms part of the compulsory course for boys in every standard. The physical laboratory, the chemical laboratory, the manual workshop and the gymnasium are superbly fitted. The provision for the proper instruction of girls is equally well thought out, and in place of the manual training prescribed for boys, girls are taught cookery, needle-work and cutting out, dress making and calisthenics.

It is not to be understood that in the desire to promote the spread of scientific and technical knowledge and skill, the importance of the study of the humanities is overlooked. Literary education, the pursuit of philosophy and of the mental and moral sciences generally, receive their due attention. There are secondary and higher schools maintained for this branch of knowledge, and the universities show their proper appreciation of them. The result is that though it cannot be said that perfection has anywhere been attained, these countries are striving might and main to evolve a harmonious system where each youth will develop his aptitudes.

The educational system in Japan is based on the most approved Western methods. Count Okuma states: "The Emperor, with great foresight, determined that the system of education of the Western world should be adopted, so that Japan could learn enough to beat the foreigners on their own ground, and thus preserve their country for themselves." It is laid down by law that all children must attend school on reaching the age of six. A clear sweep was made of the old educational system and new schools conducted on modern ideas took its place. It is stated that more than 90 p.c. of the school population are at present receiving the prescribed course of instruction. And though the education in the higher primary schools is not compulsory, 60 p. c. of the graduates of ordinary primary schools pass to the higher primary schools. No fee can be charged for primary education unless under special circumstances and subject to the approval of the local governor. Instruction in morals forms a portion of the school course both

in primary and secondary schools. Instruction in the sciences and in drawing forms a necessary portion of the upper primary and secondary curriculum. Placed in a situation very similar to that of the Indian, the Japanese insist upon the great necessity of studying some modern European language.

Above the secondary schools are the higher schools and the Universities. The aim throughout is to equip the different classes of the people with the mental and moral requisites, the literary culture and the scientific and practical acquirements suited to their different stations. The education of girls is regarded as essential and due provision is made for it.

If India has to obtain a proper place in the scale of nations she must adopt the methods which the experience of these countries has shown as most suitable. Both in the matter of provision for education and the nature of instruction imparted and the manner of imparting it, we are very far behind the European nations and the Americans and the Japanese. The total population of British India is some 23 crores; out of these only about 40 lakhs are under instruction ; 36 lakhs of these are boys and only 4 lakhs girls. Taking the population of the school-going age to be $\frac{1}{10}$ th of the entire population there are only seven out of hundred boys and girls who receive some kind of instruction. The revenues and receipts of the Government of India aggregate to about 124 crores of rupees ; out of these only 4 crores are spent for all purposes connected with education. The direct expenditure on education from public funds is about 3 crores. The efforts made and the money applied for promoting the arts, industries, and commerce of the country are exceedingly meagre. The Universities modelled on the ancient traditions of Oxford and Cambridge have severely let alone such important branches of applied science as mechanical and electrical engineering, mining, metallurgy and bacteriology. Of recent years, thanks mainly to Dr. Thomson, some provision exists in the College of Science at Poona for giving instruction in mechanical engineering. The En-

gineering College at Roorkee aims mainly at supplying the instruction which is required for officers of the Engineering and Telegraph departments. The one Technical institute fitted up to give instruction in mechanical and electrical engineering and textile manufacture owes its origin and establishment chiefly to the public spirit and munificence of the citizens of Bombay. There are only two Agricultural Colleges with sixty scholars in the whole of India; seven schools of Art with about sixteen hundred scholars and 76 Industrial schools with some 4,500 pupils. In the most advanced and populous Presidency—Bengal—which contains $\frac{1}{4}$ th of the total population of British India, there was till the other day no agricultural college, only 300 scholars in the schools of Art and 900 in Industrial schools. The Industrial schools themselves were, as the Government of India were constrained to say, wanting in definiteness both of methods and objects and produced small impression either upon industrial development or upon Industrial education.

Apart from the existing system being like its models mainly literary and classical, it had the further defect that even in the departments of mathematics and science to the extent that they received recognition in the arts Colleges, the curriculum and the test of examination were so determined as not to give adequate importance to their highly practical character. The methods of instruction have been, like those which prevailed in England till recently, very faulty. The Colleges and high schools turn out mostly people with literary proclivities, men who are only fit to be teachers, clerks, or officers in Government service, or lawyers. The fault is not of the men but of the system of education and the methods of instruction.

It would be outside the purpose of this paper to go into the whole question of general education, secondary and higher, or to enter into the controversy of the value of the classics in a general scheme of education. Confining ourselves to the strict limits of the subject before us, we have to consider what alterations in our educational system and methods are demanded by the exigencies of our economic situation.

The first thing that has to be done is to recognise the fact that some education is necessary even for workmen and artisans and that our industrial development cannot be said to be established on a solid foundation unless the mass of operatives on whose labours it would depend are better fitted physically, intellectually and morally for their work than at present. The Government have in India the same duty and responsibility in regard to the instruction of the masses that they have in England and we are justified in appealing to them to take here the action which is deemed absolutely necessary in Great Britain. The money required for this all important object ought to be forthcoming and the cost ought to fall in equitable shares upon the general revenues and the local funds. In England the expenditure on public elementary schools amounted in 1900, to £12,453,000, which is more than four times the sum spent in India for all kinds of education—university, secondary, primary, general and special. The course of study and the methods of instruction must be brought in a line with those which have been now demonstrated to be the right ones. Beginning with kindergarten where the infantile intellect is drawn towards constructiveness and familiarised with objects by brick-building, paper-cutting, drawing, &c., the children in the primary schools should be made as conversant with natural objects as with reading and writing. Drawing should be introduced from the very beginning and should form an essential part of education—primary and secondary. Manual work on wood should come in the 10th year and clay modelling a little before it. It need hardly be said that the simple rules of Arithmetic and rudimentary grammar and geography and the salient facts of history must form part of the primary course. As in the Swiss, German, and Japanese schools, bifurcation will have to be introduced from the 10th or the 11th year, according as the pupil is intended for a literary course or an industrial course, and according as his education in regard to either of these lines is to end with the primary school, or is to be continued in the secondary and higher schools. The subjects and the hours assigned to them

must vary ; but the main thing which has to be borne in mind is that mere reading, writing and arithmetic and a smattering of geography and history is not real education, and can confer but inadequate help either to workers or leaders in the keen industrial struggle which is going on. All the discoveries of science were made by men who had an inquisitive mind, who observed and watched keenly all that went around them and how it happened, who were accustomed to question nature and to obtain a reply from her. These persons may or may not have possessed literary knowledge. Their achievements were due to their powers of observation and their taste for experiment. These powers, absolutely necessary in the case of the directors, organisers, and leaders of industries, are also of very great value in the case of the ordinary workers. The pace of improvement is certainly thereby accelerated. From the industrial point of view, therefore, as also from every point of view, the great object of education should be not merely to familiarise the pupils with certain facts of history and other subjects or even of the occurrences of nature and her operations, but to build up a healthy well-regulated mind, trained to observe, to reason, to judge and to construct. The present system, especially in its primary and secondary stages, in no way helps towards the formation of such a mind. If strong men have arisen in England or India or elsewhere, they have arisen in spite of the system not on account of it. The ability to read and write is of course an immense help to an inquisitive artisan who knows his business, to learn what is happening elsewhere and to improve himself in that way. But what he was taught at school went but a small way to fit him up to be an efficient artisan.

The whole educational system existing at present will have to be greatly modified both in regard to the subjects of instruction and the manner of instruction.

It is not proposed to lay down here curricula for the different grades of schools or collegiate institutions. What has to be emphasised is that the principle insisted upon, as applicable to primary schools, ought equally, if not more,

to govern secondary and higher education. The possession of a healthy physique and a high character are as necessary for foremen, masters and managers of factories as for men in other walks of life. Drawing and manual work must also form a part of the course they have to undergo. Our schools should give the same kind of instruction in the theory and application of the different sciences, the same kind of laboratory and workshop practice as is insisted upon in the corresponding institutions of Great Britain, Germany and the United States of America.

The advance of India requires that there should be at least one secondary technical school for each district corresponding to the high schools on the literary side, one superior school or college for each of the minor provinces and two for each presidency, and one polytechnic academy and institute of research for the country. The superior schools or colleges for this kind of education should be of the same status as Arts Colleges teaching up to the B. A. standard in the matter of general education. The poly-technic academy and institute for research should provide for post-graduate study. For a long time to come it would be necessary to make liberal provision for sending some of our best young men, who have received the scientific instruction available in the technical Colleges and academies existing here to prosecute their special studies in the institutions of Great Britain, Germany, France, or the United States. The Government of India have already established some scholarships for this purpose; but their number will have to be increased.

The main thing to be kept in view is that action has first to be directed towards developing those industries which would give the largest employment to our people and to work up those products which constitute the raw materials of articles consumed in large quantities. Agriculture is the chief occupation of the majority of the people and will, even when manufactures are established, give employment to more than half of the population. The importance of increasing the productive capacity of land by the application of science is manifest.

The technical education given in public schools cannot be expected to endow the pupils with the full dexterity of the qualified operative or foreman, or the resourcefulness of experienced managers. These are developed only by practice and experience. The value of the technical education advocated consists in laying a foundation for the development of superior skill and business capacity. Its object is to teach these various classes working in the production of national wealth, the principles which underlie their various callings and to show their application.

The proposals put forward require a hierarchy of qualified teachers. Those needed for primary and secondary schools will have to be trained up in the country. Those wanted for collegiate institutions and the academy of research will in the beginning have mostly to be brought from abroad. But even in regard to these institutions the aim should be eventually to have as professors and directors of research qualified Indians who have acquired the requisite knowledge in the best institutions existing in the advanced countries of the West.

It is not only in schools and for young boys and girls that provision for instruction has to be made. The majority of the people in India are in such poor circumstances that a lad of 12 or 13 lies under a compulsion to begin to work for earning his living and helping his father in the support of the family. Such a state of things is not, however, peculiar to India, and as in Germany, Switzerland and other countries, this difficulty should be met by the establishment of continuation schools, evening classes and regular courses of public lectures and demonstrations.

Owners of large factories and industrial establishments in Europe and America find it profitable in their own interests to make arrangements in some such wise for extending the mental vision and knowledge of their operatives. Mechanics, institutes, libraries, museums, laboratories have exercised in those countries an immense influence in bringing about the present high level of general advance.

It need hardly be said that these things are not asked to be introduced all at once. Progress to be real and permanent must be gradual. But the example of Japan demonstrates that it is entirely wrong to say that progress can only be achieved at a snail slow pace.

The Government of India do not seem to be wanting in their appreciation of the importance of industrial development and the close connection which scientific and technical education has with it. But their performance in this direction is hardly commensurate with their declarations. Indeed the latest Government resolutions on this subject lay down propositions which are far from reassuring. They find fault with the educated classes that they go in only for literary and classical education. On the other hand there is the injunction issued to the Local Governments that members of the higher or educated classes are, as a rule, not to be allowed to receive the benefit of the facilities suggested to be afforded for the extension of technical education. The proscription of English and the direction that the vernaculars are to be the vehicles of instruction, show that it is not secondary and higher technical instruction which is proposed to be encouraged. The utter inadequacy of the action proposed in the Government resolution is obvious. After what has been said before, it is not necessary to give the assurance that the importance of creating a class of trained and educated operatives is fully recognised. But it must be stated that the most important factors in the increased production of national wealth would, in the case of India, at least, at present, be the leaders, managers, directors, and supervisors of industries. It is the skill, capacity and training of generals and captains which determine victories more than the bravery and steadiness of the rank and file of an army.

We stand in need of a system of National education which will cultivate the brain, train the eye and give dexterity to the hand, which will develop the powers of observation and experiment and create a general taste for the study of nature, a desire to understand the working of her powers and utilise them for the benefit of mankind. The system

must aim to produce a class of qualified workers, qualified supervisors and qualified directors and leaders. In other words there must be universal primary education, widespread secondary education, and sufficiently ample provision for the study of the higher branches of science and the promotion and encouragement of research. Such a system is possible only if there is active sympathy and support of the State. While gratefully acknowledging our indebtedness to the British Government for the enlightened and wise spirit in which it has on the whole dealt with the question of education since 1854, it must be confessed that what has been done till now, though by no means of small value and benefit in itself, cannot but be deemed to be little when we bear in mind the immensity of the task that has to be accomplished. It will be necessary for Government not only to devote as large a portion of the public money as they have been doing but to multiply the allotments many times. Primary education must be made compulsory. Every boy ought to be made to attend some school from the age of six to the age of twelve. Compulsory attendance in a school necessarily implies the provision of free instruction in every village and town. The burden should be equitably divided between the general Revenues and Local Funds. Scientific and technical education must receive far larger attention than has been given till now. But it is not on Government alone that the responsibility of accomplishing these objects rests. We have an equally heavy duty to perform. Men of light and leading, men who are blessed with the good things of the world, lie under the obligation of co-operating with Government in the vast task that has to be performed. We must ever bear in mind that no nation can achieve its salvation unless it is actuated by a high sense of duty and is prepared to sacrifice considerations of self-interest, personal ease and comfort for the promotion of the general weal. Heaven helps only those who help themselves.

It is not by indulging in idle dreams or vague longings or empty talk that any result can be achieved. It

is sustained action and strenuous efforts nobly conceived and wisely directed, that are required. We must have faith in work, and firm reliance on the immutability of the principles of justice and righteousness which under the Supreme intelligence govern the Universe.

कर्मण्येवाधिकारस्ते मा फलेषु कदाचन ।
मा कर्मफलहेतुभूर्मा ते संगोऽस्त्वकर्मणि ॥

Trust no future howe'er pleasant !
Let the dead Past bury its dead !
Act, act, in the living Present !
Heart within, and God o'erhead !

NECESSITY FOR AN INDIAN COLLEGE OF TECHNOLOGY.

BY DIWAN BAHADUR K. KRISHNASWAMI RAO, C.I.E.,
Late Dewan of Travancore, Madras.

If India is to regain her lost place in her industries, she must learn to use steam, gaseous or electric power much more extensively than at present. Hand-machines, however good they may be, will not meet the demand of the country for manufactured articles ; and make us independent of imported goods. The use of steam, gas, and electricity require a thorough knowledge of mechanics, theoretical and practical, and of the scientific processes used in America, Europe and Japan in manufactures. It is a matter for deep regret that India is not yet blessed with an institution, in which the required scientific and technical knowledge and training could be obtained to enable us to work our industries on advanced lines without foreign aid. In making this observation, I have not overlooked the existence of a number of technical schools established by Government and private agencies in several places. But the instruction given in them is too elementary to be of any practical use, in so far as the substantial improvement of the productive

capacity of our industries is concerned. It is often said that our deplorable condition is due more to our want of public spirit, enterprise and mutual trust which are indispensable to the combination of capital, skill and labour without which no large and profitable undertaking is possible, than to the absence of a first-class technical institute in India ; and that at present there is no adequate demand for highly skilled labour to justify the heavy expenditure involved in the establishment of such an institute. We have in India more than 1,200 mills and factories worked by machinery. The skilled labour they require is more than what one well-equipped institute of technology could supply. More mills and factories will come into existence to meet the growing demand for the indigenous manufactures. The existing mills and factories are now worked under great disadvantages, and even at a comparative loss by having to import from foreign countries, not only the necessary machinery but also the mechanical engineers to set them up and work them. I believe there is not a single workshop in the whole of the Indian Empire, where a small gas engine of the simplest character could be constructed. Mr. Chatterton has demonstrated the superiority in efficiency and economy of oil-engines for pumping water for irrigational purposes. It is a matter for gratification that some of our intelligent and well-to-do agriculturists have begun the experiment of pumping water by this improved means. The success of the experiment which seems to be certain, will raise a great demand for pumping engines. But the inability of the Indian workmen to repair engines whenever they may go out of order and the heavy cost of sending them for repairs to distant workshops and getting them back, may greatly tell against their extensive use. There is no industry which may not require the use of machinery, if it is to serve the country efficiently, under the present conditions. All these circumstances are, I hope, sufficient to prove that there is a demand for advanced technical knowledge and skilled labour enough to warrant the opening of at least one first-class college of technology in India.

2. The system of granting scholarships for technical education in foreign countries, is wholly inadequate to secure the supply of the large number of men with advanced scientific and technical knowledge, required to meet the growing demands of the Indian mills and factories. Climatic and religious considerations and the inconveniences of residence in a foreign country, vastly differing from India, in manners and customs and especially in food and drink, deter many a promising youth from availing himself of scholarships. In the nature of things, the scholarships available must be few. The donors generally attach conditions to them, which often discourage would-be candidates to seek them. Moreover, no amount of private philanthropy and effort will ever be able to secure as many skilled workmen under the scholarship system, as a well-conducted local college of technology will do. Scholarships can serve only those few who are able to go successfully through the full course of technical studies and training, but not those many who may have to be content with such knowledge as may be acquired by undergoing only a part of the course. The latter are required in much larger number than the former, for industrial service in subordinate grades. They will certainly render more effectual service than those who are totally ignorant of any technical knowledge. A local institute alone could bring into existence, this class of workmen. The tendency of every civilised nation now seems to be protection of home-made articles and the boycott of foreign manufactures. I am afraid that it may end in the closing of foreign institutions against Indian students.

3. To make India independent of technical education in foreign lands and of foreign machinery, and to procure locally a decent supply of high class skilled labour, the opening of first class technical colleges in important centres similar to those found in Europe, Japan and America, is an imperative necessity. The contemplated Tata's Research Institute may go to some length to meet the existing wants. But we cannot be sure of this until we see the scheme of instruction and training to be

given therein, finally settled and the institution opened. Research being the main object of the proposed institute, it is open to doubt whether it will help us to the extent required with the practical knowledge needed for the construction and repair of machinery and for the use of the chemical and mechanical processes in all manufactures. The weaving industry which is the most important next to agriculture in India, demands the earliest and most earnest attention. Agriculture has happily attracted the attention of Lord Curzon's Government. Improvement of weaving industry deserves the best consideration of the Government of India. I need hardly say that this much-wanted and urgent improvement cannot be secured without opening colleges of technology in which all industries are taught to perfection. At least one first class technical college with the necessary library, laboratory, museum and workshop should be opened in some central part of India. It may require an initial expenditure of not less than a crore of rupees and an annual expenditure of not less than a lakh of rupees. It may be made an ALL-INDIA INSTITUTE, being open to the British subjects and the subjects of the Native States and financed by the Government of India and Native States and also by the nobility of India in the same manner as the contemplated Tata's Research Institute which is to receive financial aid from the British Government and the Mysore Durbar to supplement Tata's princely munificence.

I would earnestly urge upon the first Industrial Conference the necessity of taking into their serious consideration, the proposal I have herein made, and of adopting measures to secure for Indian students of technology, a well-equipped local institution, worthy of this Great Empire.

INDUSTRIAL DEVELOPMENT.

By T. R. A. THUMBOO CHETTY, Esq., C. I. E., *Late Acting
Dewan of Mysore, Bangalore.*

So far back as 1868, when I took part in a debate on the subject of *Popular Education* in the Bangalore Bowring Institute, I dwelt on the paramount obligation that devolved on the state of diffusing general *useful* knowledge to the masses of the people, and of imparting such practical technical instruction as was likely to develop and promote the various branches of manufacture and industry peculiar to each village or locality, as well as those old professions, however small, to which the villagers were accustomed as a sort of hereditary occupation. I, also, advocated the introduction, in school, of a system of *Practical teaching in the principles of Agriculture with improved appliances.*

2. Eight years later on, when addressing the students of the Bangalore St. Joseph's College, a majority of whom were European and Eurasian lads, I exhorted them to *learn some useful art, or industry, by choosing some particular branch suited to their taste and capacity.*

3. Recently, in 1901, when presiding at the celebration of the Madras Christian College Day, I remarked, that it was a matter for regret that, with the progress education had already made, little or *no aptitude was shown by the Indians for scientific work or research*, with a view to the rich resources of the country in metals, minerals and agricultural productions, being more properly and profitably improved and developed, by being brought under the power of machinery.

4. In Mysore, under the enlightened direction of the present ruler and of his illustrious predecessor, much has been done in the direction of Railway extensions, in the establishment of industrial schools and experimental farms at certain stations, in the introduction of improved ploughing instruments, and in starting large irrigation projects, and in the successful installation of the Cauvery Electric Water

Power Scheme. In the way of general Agricultural Improvements, encouragement of technical education and development of industries generally, the Mysore Government is doing much; but what I would wish to urge for consideration is the strengthening of our principal village units, for promotion of general Agricultural, Industrial and Commercial purposes. Our Village Communities, as remarked by Sir Charles Metcalfe, "are little republics having nearly everything that they want within themselves and almost independent of foreign relations." At the first meeting of the Royal Commission in England for the collection of Indian exhibits, Lord Kimberley very wisely said :— "There is, perhaps, nothing more desirable for India than that its products and industries should be well known in this country, although we have much to learn from them than to teach them. Their beautiful manufactures, which they have produced for so many ages, have proved that there is a knowledge of many branches of art which, it would be a thousand pities, should be diminished under our rule. I have often been struck with the calamity of the introduction of our taste into Eastern arts and manufactures, for their taste is far better than ours, although we have no doubt English knowledge and skill and the command of capital, and I cannot conceive any advantage greater than that the two countries should be brought together." How England and India could be brought together, in the matter of science, industry and commerce, is the real question, on the proper solution of which depends India's future national prosperity. It cannot be denied that the ancient arts and industries of India attracted the Greeks even before the age of Pythagoras, and induced them to travel to India for instruction and to exchange commodities with the choicest productions and manufactures for which our country was celebrated. But the ravages of time, foreign conquest and the consequent cessation of encouragement and continuous improvement have caused such a neglect and degeneration, that, being sensible of the state of splendour and civilisation in arts and sciences which India once occupied and from which it had fallen off, every

endeavour should be made to ascend to it again, this being practicable under the benign rule and protection of the British Government. The revival must commence with the village unit and be gradually developed with the combination of western learning, invention and capital. Before we could reach the summit of a hill we must work from the bottom, hew the rough stones and pave the way, slowly and smoothly, to climb up. The preservation of the village constitutions with proper training in commerce and agriculture, must form the basis of technical education to start with. The improvement of agriculture and the commercial capabilities of each locality must commence with the village unit, so as to form the nucleus and preserve those elements necessary for the reconstruction of that Grand Indian Edifice of Commerce and Agriculture, and the formation of corporate bodies, to work with the object and on the principle suggested by Lord Kimberley.

5. There is, on the part of our countrymen, little temptation to invest capital, and still less to improve it. We want men likely to take interest in the improvement of capital, and to point out some of the most desirable modes of employing it usefully and profitably. But for this tame and unenterprising disposition of Indians, the rich mines of the Kolar Gold Fields would not have fallen to the lot of European Companies to work and thereby to acquire enormous wealth.

6. With the development of the resources of each village unit, in point of agriculture and commerce; with the gradual formation of Indian Corporate Bodies; with the combined capital, energy and skill of England and India; with the removal of all those duties that press injuriously upon the industry of India; with the sympathy, support and co-operation of Government to give the initiatory stimulus to private enterprise and a start to the general expansion of technical and scientific education of a practical kind, the sources of India's wealth and prosperity will be increased and developed to the joint advantage of India and England, thereby affording the best security of the British Indian Empire.

THE CHIEF DIFFICULTY THAT RESTRICTS MODERN MANUFACTURES IN INDIA.

By W. MARTIN Wood, Esq., *Formerly Editor
of the "Times of India."*

There is one real practical restriction on the spread and increase of machine power-driven manufactures. That limitation is prescribed by the extent—as regards distance and cost—of coal-fuel for driving machinery—that is, as regards Indian coal-fields on the one hand, and access to the seaports for European coal. This check, as to both sources, varies indefinitely; but, in its nature and practical effect, it is inexorable so far. Here may be left aside, for the moment, the use of wood-fuel for creating steam-power to drive machinery. That resource is increasingly limited; and its use—except when and where the Forest Department can reproduce it—is much to be deprecated on every sanitary and fertilising consideration.

It is very important for Indians to carefully weigh this, at present, master factor of the industrial situation in India. It is for them to direct their attention to the discovery, for India, of some other motor power than steam; and especially to consider where and how far water-power by gravitation can be applied, either directly, or through the generation of electricity.

THE LINES OF INDUSTRIAL DEVELOPMENT IN INDIA.

By H. J. TOZER, Esq., *India Office, London.*

Every one who desires the progress and prosperity of India must feel that the question of industrial development is of supreme importance. I therefore welcome with pleasure and hope the meeting of the first Industrial Conference. No fitter place of assembly could be chosen than the ancient sacred city of Benares, to which, for 3,000 years, millions upon millions of Indians have turned for light and guidance.

As a slight contribution to the work of the Conference, I may perhaps be allowed to summarise the results of my recent enquiries concerning India's manufacturing industries, trusting that, in my endeavour to be brief and practical, I may not appear dogmatic.

(1) Agriculture, for any time worth considering, must be by far the most important Indian industry. In order to increase the produce of the soil, and the profits of the cultivators, educated Indians might lend aid in popularising new staples and better implements, in encouraging the use of selected seed, and generally, in advocating improved methods of cultivation. The advantages of co-operative credit societies might also be explained to raiyats and artisans.

(2) Hand-loom weaving, the most important industry after agriculture, still shows much vitality, in spite of the competition of steam machinery. Although this ancient handicraft may ultimately be forced to give way under the pressure of competition, it is of importance socially that the process of decay should be gradual. The introduction of an improved hand-loom consequently appears desirable, but careful enquiry will be necessary to ascertain what kind of loom is best for ease and effectiveness of working. The purchase of the new looms might be facilitated by a system of advances.

(3) Industries closely associated with agriculture require the application of more scientific methods. Sugar production and oil-pressing could be made much more lucrative by the adoption of improved processes and by the utilisation of by-products. There has been a regrettable decline in sugar production. The cultivation and manufacture of tobacco are also susceptible of improvement.

(4) The production of manufactured articles of a complex character on a large scale by up-to-date methods requires—

(a) The choice of a locality in which raw material and fuel can be obtained cheaply, and from which the manufactured products can be readily transported to the consuming markets.

- (b) An adequate supply of capital, so that production may not only be on a large scale, but on the best methods, and so that periods of depression may be tided over.
- (c) Provision of the most recent machinery and fittings.
- (d) Capable directors, possessing financial and commercial knowledge, aided by business managers with a complete grasp of technical details. European managers, even at high salaries, are most economical, until a race of Indian managers has been trained.
- (e) Well-paid and skilful artisans, whose hours, on grounds of true economy as well as of humanity, should be carefully restricted.

Indians have done a good deal in the production of cotton and jute goods, and there are possibilities of expansion not only in these manufactures, but also in those of silk goods, leather and leather goods, iron and steel, paper, soap, &c.—attention being concentrated for the present on the simpler varieties of such articles.

Now that there is general agreement among educated Indians concerning the need of industrial development, it is to be hoped that practical work will soon be undertaken. Some failures are inevitable at the outset, but with courage, persistence, enterprise, and mutual confidence, a large measure of ultimate success is assured.

In conclusion, I would point out that industry is but one function of the social organism, and that for its free play and development conditions of a non-economic character must also be favourable. Thus social prejudices, differences of creed and caste, may impede industrial progress. These difficulties can only be indicated. Their solution must be left to those who have an intimate knowledge of Indian life and thought, enlarged by ideas imbibed from Europe, America and Japan.

INDUSTRIAL WORK IN INDIA.

By ALFRED CHATTERTON, Esq., B.Sc., *Superintendent,
School of Arts, Madras.*

Industrial India has of late years developed rapidly, as a reference to the trade returns will show, but the work has been due to foreigners and to imported capital, and the profits accruing therefrom instead of accumulating in the country are remitted abroad so that the people of India benefit by the establishment of these prosperous undertakings only to the extent that a certain number earn wages in subordinate positions or by doing cooly work. The management and direction of such enterprises are not in their hands and no fund of experience is being accumulated in the country which will enable further progress to be made. For nearly a century in industrial matters stagnation has prevailed, and enterprising Europeans and Parsees have been allowed to monopolise progressive methods of working. With the result that now, when Hindus begin to realise the necessity of doing something, they find all points of vantage occupied and they are either appalled at the difficulties which confront them or go light-hearted into foolish ventures which can only end in failure and the loss of their capital.

Time was when India was practically on a par with Europe in industrial matters but now it is a long way behind and in the little that has been done the great mass of the people of the country have taken no part. Thoughtful members of the community recognised this 20 years ago, and by the spread of technical education they were encouraged to hope that a remedy could be found. As much technical education has been provided as the country could assimilate, but it has resulted in nothing. Other careers offered fairer prospects to intelligent and adventurous youths and only those who were likely to be hopeless failures in other walks of life sought for technical instruction, and they have profited little by it. Of late, however, it is possible

to discern a tendency to better things. The Government services, the legal profession and the mercantile officers are no longer able to provide employment for the ever-increasing number of educated youths who, year by year, are discharged from our educational institutions. The industrial problem has been agitating the community greatly during the last few years. Much has been talked and written and a little practical work has actually been done. One result has been to raise enormously the status of those that are engaged in manufacturing industries in the eyes of the rest of the community.

The most encouraging feature of the situation to-day is the fact that both the Government of the country and the educated classes fully recognise the necessity of doing something. The Government of India by their system of technical scholarships, which are freely granted to promising youths in all parts of the country, are endeavouring to supply, by providing the means for going abroad, the lack of experience which has already been mentioned. All over the country industrial schools are maintained by Government or receive Government assistance, and although so far it cannot be said that they have achieved any noteworthy result, yet they are a preliminary step in the right direction, and it is possible that later on the proper function, which they should discharge, will be discovered. In the South of India, the Government of Madras have gone farther than elsewhere and have practically established a department, the avowed object of which is the improvement of Indian industries. New industries have been started and old ones taken up and worked experimentally with a view to ascertaining the possibility of introducing improvements.

The details of our work in this direction would be too technical and too complicated for me to discuss within the brief limits of this note. But it seems to me that it may be a useful contribution to the deliberations of the first Industrial Conference, if I endeavoured to briefly set forth the principles which underlie the apparently disjointed work which we are now carrying on.

A survey of the condition of the indigenous industries of this country reveals the fact that no attempt has ever been made to render them more efficient by reorganising them on modern lines or by placing at the disposal of the workers the practical applications of modern scientific discoveriers. As their forefathers worked; so do the artisans of to-day; without capital, without organisation, without machinery or mechanical assistance, and with only the tools and appliances in common use before the modern manufacturing era began. Each man works for himself or at the most is associated with other members of his family, and the advantages of the sub-division of labour are either not appreciated or beyond the reach of artisans who being without capital might yet combine together, but have so little faith in one another that only rarely do they unite to achieve a common end.

That the indigenous artisan has managed to survive under such adverse conditions is in itself an encouraging fact to those who think that in India something may yet be done to create native industrial enterprise on an extensive scale. At the same time it has led to the establishment of very erroneous ideas regarding the efficiency of native methods of working. The cheapness of native labour has been greatly exaggerated, the possibility of training it much under-estimated and the people generally credited with conservatism and dislike to changes which has no real foundation in fact.

For three years at least we have been engaged in experiments on lifting water for irrigation from wells and minor sources of water-supply by oil engines and pumps and though it has been conclusively proved that the work can be done for at least one-half the cost of the best native methods of working, yet there are few who accept the fact or think how great a revolution it is bound to produce in the agriculture of the country.

In the Aluminium Department which was our first industrial venture we started with no innovation on native practice except the introduction of the new metal. Experience showed that the cost of production was very excessive and by degrees new methods of working were introduced. The

men readily took to them and easily adapted themselves to a system of manufacture based upon intelligent sub-division of labour. Improved tools and machines were introduced only when it was certain that they could be effectively employed and the artisans rapidly acquired dexterity in using them. The final stage of evolution was a factory fully equipped on modern lines supplemented by skilled hand-labour to an extent impossible in countries where the rates of wages are much higher. The Aluminium industry is now in the hands of a local company in Madras, and although the Directorate is mainly composed of Europeans, from the workshop Manager, downwards, everyone engaged in the manufacturing departments is a native of this country, and it may be confidently asserted that the cost of production is as cheap there as anywhere in the world.

The natives of India have been credited with conservatism and stupidity mainly because they were wiser than their would-be instructors. The reluctance of natives to use appliances imported from abroad may almost invariably be ascribed to the fact that they were unsuited to local conditions. For instance, English ploughs and English agricultural machinery are, as a rule, unsuited to native conditions, and they have met with just the measure of success they were entitled to; but the sewing machine which can turn out work much cheaper than by hand is to be found in almost every native village and no serious difficulty has been experienced in using it and keeping it in order although it is a complicated piece of mechanism. Examples of the general adoption by natives of what to them were novelties which proved suited to their requirements are extremely numerous and as typical illustrations may be cited (1) the substitution of kerosine oil for locally made vegetable oils, (2) the almost universal adoption of iron sugarmills in place of the old native wooden mill, (3) the extensive use, where capital is available, of such machines as the modern cotton gin, the rice-huller, the screw press for extracting oil, and in the South of India, at any rate, the wealthy natives have discovered that a small hand pump can be used with great advantage to distribute

water over their houses. Briefly within the limits of my own experience I have not found the native of India in the least degree averse to adopting improvements when he is convinced that they are real improvements and that he can adopt them profitably.

No very long time has elapsed since we introduced chrome leather as a material eminently suited for native requirements. We had to learn how to make it ourselves first and were perhaps somewhat precipitate in placing it upon the market. The result was that a certain amount of defective leather was undoubtedly sent out. Yet that did not deter people from trying it, and now that it has been in use sufficiently long to have proved beyond cavil that it is suited to local conditions, the demand is rapidly increasing. The success in this direction is so marked that I confidently anticipate it will take but few years to practically displace the inferior vegetable tanned leather now in general use.

Again in the matter of irrigation by oil engines and pumps, the initial difficulties to be overcome and our total lack of experience in the matter were so great that the surprising fact is not that so few have been installed by private enterprise but rather that so many have taken them up.

I have dealt with this matter at some length, because it is extremely desirable that erroneous impressions regarding the enterprise of people in this country should be done away with. I do not claim that I have found them as go-ahead as Europeans or Americans, but I do contend that there is, among the 300 million people of this country, a small percentage who are endowed with as much energy and vitality as will be found among the Northern races. A very small percentage of such a vast number is absolutely a very large figure and till all these have been put on the right track and their latent capabilities fully utilised we have but little right to discuss the indolence and lack of enterprise exhibited in India. To a large extent the qualities of the modern educated Hindu are the result of his environment and system of education. The latter has been moulded too much on literary lines and has been designed to produce what it has actually turned

out. If you want men of a more practical turn of mind, give them a more practical education, study the systems which have been evolved in Europe and America and introduce greater variety into the curricula of the schools and colleges in this country, and the result will be a class of men capable of dealing with the industrial problems which at present confront us. Any change of this kind, however, must be the work of time, and for the present it is more important to devise measures for immediately making use of such material as is available.

A survey of the past history of industrial undertakings in the South of India shows that there has been a good deal of misdirected enterprise. Companies have been formed and capital has been found for undertakings which from the beginning were doomed to failure. The unwary investor has been caught by the sharks and joint-stock enterprise has justly earned a somewhat evil reputation. Unfortunately in India that fund of practical experience to which I have already twice alluded is not available and has never been applied to the resuscitation or improvement of indigenous industries. It is practically impossible for the enterprising individual with capital to obtain disinterested advice and assistance regarding any undertakings he may be desirous of starting. Few study the conditions under which the native works sufficiently to be able to give him competent advice and those who have the necessary knowledge are generally not in a position to do so. Nearly every day schemes of this kind are sent to me for an opinion as to the probability of their turning out commercially successful, and it is easy to deal with the majority of them because they are hopelessly impracticable. I may therefore perhaps claim to have done some useful work in dissuading a considerable number of people from embarking on ill-considered ventures.

When a law suit is in the air it is well understood that funds must be forthcoming to pay for the best legal advice obtainable and the dignity of a suit and the pleasures of litigation are much enhanced when persons of repute and eminence can be retained by the rival parties. This is a

very satisfactory state of things for the lawyers, but in matters appertaining to industrial enterprise, the people of this country have not yet been educated up to the advantages of obtaining the best expert assistance in working out the details of industrial undertakings. In time they will doubtless come to realise it, but in the meanwhile it may, I think, be within the province of the Government of this country to do what it can to demonstrate the necessity for such help.

In each province it might be made part of the duties of specially selected officers to deal with applications of this kind, and if the work were well-done, it would establish confidence and encourage enterprise. In the Madras Presidency, this has to some extent been recognised, and the services of expert officers can usually be obtained by *bona fide* applicants. To distinguish those who really mean business from those who do not is a matter of some difficulty, and under the prevalent undivided family system it is practically impossible to determine whether a man has at command the resources which are apparently at his disposal.

Comparison with other countries shows that India, and here, let it be clearly understood that I am speaking of indigenous India, avails itself but little of the various sources of power which modern engineering science has placed at the service of man. The scale on which work is done has hitherto been too small for the profitable application of such methods of working, and, even where it was otherwise, capital was lacking. Where neither of these objections existed progress and improvement were barred by inability to appreciate the advantages of any change in time-honoured methods of procedure. Within the last few years there has been concurrently a great change in the attitude of the people of the country towards such improvements and a marked advance in the value and adaptability of the sources of power and their modes of application. Recognising this, the Government of Madras have rendered it comparatively easy for many people to avail themselves of modern improvements by a liberal interpretation of the Agricultural Loans.

Act. If a man has land suitable for intensive cultivation and a supply of water adequate for its needs, he can apply to Government for a loan to purchase an engine and pump. The scheme is reported upon by experts and if it is likely to prove satisfactory a loan sufficient to enable it to be carried out is sanctioned, and the actual supervision of the installation is carried out by Government officers free of expense. A fair number have already taken advantage of this liberal policy, and there is no doubt that the success of the pioneer installations will, in the near future, lead to an enormous extension of this method of obtaining water.

Already it has been found difficult to provide sufficiently trained men to take charge of such machinery and to get over this obstacle which threatened to prove a very serious one, a school of engine-driving has been started and boys from up-country villages are received and put through a course of training in fitters' work and engine management sufficient to enable them to be safely trusted with the running of these modern motors. All that it is at present attempted to do is to train a man or boy to look after an engine, to attend to its various needs and to keep it clean. He is not supposed to undertake repairs as if anything gets out of order and the engine works unsatisfactorily, a staff of specially trained men are maintained in Madras for the purpose of putting such matters right. By adopting this plan natives of the South of India will gradually become accustomed to the use of machinery and probably in time, they will freely avail themselves of it.

It will thus be seen that in Madras our contributions towards the industrial development of India have taken the form of introducing into India materials and methods of working unknown in the country but perfectly well known among more advanced communities where progress is more rapid. The success we have met with in the past and that which still remains to be achieved in the future depends entirely upon the accuracy with which we have gauged the requirements of the people. Aluminium working was first introduced with the object of creating for it a sufficiently

large market to warrant the establishment of factories in the country for the production of the metal from the raw materials which are known to exist. The industry is making steady progress but the goal is still far off and the demand for aluminium wares will have to be at least five or six times as big as it is, before we can hope to make the industry independent of imported metal. There is no doubt that India could easily absorb with advantage a great deal more metal than this, and it will be interesting to watch how the Swadeshi movement affects the success of one of the pioneer attempts to improve the native industries.

The chrome leather industry is likely to prove very much more important than that in aluminium and its successful introduction will materially increase the visible wealth of the country. The exports from India of raw hides and skins and of half-tanned materials, as you are aware, amount to many crores of rupees and it may be with some approximation to truth asserted that the internal consumption of leather in India is at least equal to the value of the export trade. Most of the leather produced in India for internal use is shameful waste of valuable material. For Indian requirements chrome leather can be produced in the country much more durable than anything produced by the vegetable tanning processes. It therefore follows that exactly in proportion to the amount of chrome leather manufactured in India so will surplus supplies available for export increase. Moreover we are fortunate in being able to find in Europe and America an unlimited demand for anything we have to spare. It may be urged that we are only at the beginning of the chrome leather business and that to some extent I am counting chickens as yet unhatched. But, as a matter of fact, the main difficulties connected with the inception of this enterprise have been overcome and there is ample evidence to justify our anticipations.

Again, in the matter of oil engines and pumps we are only adapting to Indian requirements something that is well known and much used elsewhere. In this case we cannot yet say

that final success has been achieved, but the prospects are very hopeful, and I am certain that it only requires patience and continued application of scientific and engineering skill aided by the invaluable provisions of the Agricultural Loans Act, to enable us to achieve an important revolution in agricultural methods. Of the irrigated area in India fully one-fourth is dependent upon wells for a water-supply, whilst the average value of the crops on land so irrigated is at least 50 per cent. greater than those grown on lands irrigated from other sources of water-supply. It is only of late years that the value of well irrigation has been fully realized but till lately the ryots have been left to flounder in their ignorance and the resources of modern engineering science have not been called in to assist development. The average area irrigated by wells in the Madras Presidency does not exceed $2\frac{1}{2}$ acres, mainly because cattle labour is such a feeble source of power. It is too early yet to say what will be the average area under selected wells where oil engines and pumps are used to lift the water to the surface, but it will certainly not be overestimating it to put it at ten times the present area.

Any extensive adoption of machinery to assist agricultural processes will lead to important changes in the industrial conditions of the country and must of necessity produce an expansion of internal trade. The cultivators taking advantage of these new methods of working will have to go in for intensive cultivation to make them profitable and they will have to grow produce which they can sell in order to purchase and pay interest upon the engines which they employ and the fuel which they use. Agriculture is by far the greatest industry in India and upon this industry the success of all others ultimately depends. It is therefore obvious that in any attempt to deal with industrial development, agriculture must receive in the first instance the lion's share of attention. With capital and skill the possibilities seem immense, but I must leave it to touch lightly upon one other industrial question before I bring this note to a conclusion.

The subject of hand-weaving in India will be brought before this Conference by my friend Mr. Havell, the Superintendent of the School of Art in Calcutta, whose advocacy of the claims of the fly-shuttle loom has done so much in Bengal to prepare the ground for the revival of interest in indigenous industrial development which has given rise to the Swadeshi movement. In Madras we have experimented with hand-weaving for nearly five years and the conclusions we have arrived at and the measures necessary to make any further advance were the subject of a special report which was submitted to the Government of Madras in September last. This report was communicated to the Press and has been widely circulated and commented upon in all parts of India. I therefore do not propose to go over the same ground again, but I would like to draw your attention to the very complex nature of the problems to be dealt with and to emphasize the fact that no single factor is of supreme importance.

The modern power-loom in its various forms exemplifies in the highest degree the skill of the mechanician and the tendency is to construct a simplified and lighter form of power-loom which can be worked either by the arms or more frequently by the feet. This, to my mind, is no solution whatever of the problem and the work which is going on in this direction is doomed to be an egregious failure. Assuming, however, that a really good hand-loom is produced, and I think there is no doubt whatever that it will be produced, we have only one factor in the problem which has been eliminated. The question of producing good warps is undoubtedly much more important than the question of the hand-loom. The problem has been solved in regard to the power-loom weaving industry, and as a last resource the same solution can be applied to the hand-weaving problem. In the weaving factory which we are about to start in the Madras Presidency, we are going to attempt a solution of this problem on somewhat novel lines ; but if we do not achieve success, by working on a big enough scale we can always fall back upon the slasher-sizing machine which has proved so satisfactory in power-loom factories.

Hand-woven cotton goods enjoy a reputation for durability which is usually attributed to the merits of the hand-weaving process, but in reality the hand-loom contributes but little to the final result as the superiority of hand-woven goods is mainly due to the superiority of the native sizing processes. The native weaver with the brush sizes his yarn in a way that no machine can do, and I very much fear that in our hand-loom weaving factories we shall ultimately produce what are practically power-loom goods.

I am personally of opinion that the hand-loom weaving factory will ultimately prove a very powerful rival to the power-loom factory, but to what extent it will improve the present condition of the weavers is so extremely complex a question that no certain answer can be returned. The lot of the weaver in most parts of India is so very miserable that a worse fate cannot possibly befall him. But it is possible that any extensive establishment of hand-weaving factories, with their superior equipment and immensely increased rate of outturn, may completely deprive of employment large numbers of weavers who still manage to eke out a miserable existence. These people will have to find new employments and other sources of livelihood, and it is probable that in the process of transfer much hardship may be experienced. On the other hand, it is by no means impossible that the hand-loom weaving factory may be able to regain ground and compete successfully against the power-loom in certain classes of goods. This would undoubtedly mean increased employment for hand-weavers, a considerable rise in wages and a general amelioration of their condition.

In conclusion I feel bound to express the opinion that here in Madras we are working on lines which are likely to bring about industrial development in India by the people of India and for their own advantage. Capital must be forthcoming to establish these industries and the brains and the intelligence of the country must be devoted to carrying them on. Huge schemes involving lakhs of rupees of capital will be difficult to start and must almost inevitably come under European management. For the small factories, which it is

our aim and object to establish, capital should be readily forthcoming, and in their management and working there will be a wide field for the employment of considerable numbers of the educated classes. The constant tendency towards increase in the scale of manufacturing operations which is exhibited in its most intense form in America is to some extent counterbalanced by the increased facilities which we now possess for the generation and distribution of power, and I am certain that if the people in this country are but properly educated, the extremely low cost of living provides a means whereby they may meet the competition of both labour and capital in countries where the necessities of life are more numerous and much more expensive.

THE ORGANISATION OF CAPITAL IN INDIA.

By REGINALD MURRAY, Esq., *Chief Manager, Commercial Bank of India, Limited, Calcutta.*

I understand that your flattering invitation to me to address this important meeting is due to my having published sundry pamphlets entitled "Advance India," "Wealth in India," and "A Gospel of Credit," and to my having given some evidence therein of having studied the theory and practice of credit, according to its evolution in the United Kingdom and some other European and American countries, and of having endeavoured to stimulate what I regard as a creative force for the better development of the industrial, agricultural, and trade finance of this great country. You do not, therefore, I imagine, desire from me any further elucidation of the theory of credit, but only such practical suggestions as I can make for establishing or encouraging the organisations necessary to give practical force to my recommendations.

The object in view, as I understand it, is to tap the capital wealth of India and create a constant flow of money for the benefit of the capitalist and those by whose labour, skill and intelligence wealth is increased. It may happen, and

does occasionally happen that the industry, application and knowledge of a capitalist enable him to apply these qualities directly to works of importance and profit, but even in his case, which is exceptional, there must always be a residue of capital lying idle, which if deposited in a good distributing concern would at once become active.

Two important principles are here involved:—(1) the active distribution of unused capital; (2) the relegation of the act of distribution to experts.

For the organisation of this system the form of financial concern which has best proved its soundness and utility is the Joint-Stock Bank. You have seen on the last page of my pamphlet "A Gospel of Credit," the reasons why everyone should deposit his savings (or residue) in Banks. I think they will bear repetition on this occasion. They are as follows:—

1. If money is kept in a private house it attracts thieves. If thieves come to take money they may take lives as well.
2. If money is kept in a house or in a hole in the ground, the possessor earns no interest. On all money deposited with Banks, a depositor receives interest which is paid half-yearly.

3. Money deposited in Banks is more readily available and gives the owner less trouble than money kept in a house or buried: because if he wants to make a payment, instead of opening boxes and counting coins and notes, he writes a cheque and the Bank takes all the trouble for him. Similarly, if a depositor receives payment by a cheque, instead of going a journey and collecting the money himself, he sends the cheque to his Banker, who saves him the trouble without charge.

4. Keeping money on deposit with a Bank costs nothing, but on the contrary yields a bi-annual return. Money kept in a house or buried costs much time and trouble, and if strong rooms or vaults are built or iron safes purchased, the expense is considerable.

These are reasons which apply to every holder of money, whether the sum be great or small. Their practical applica-

tion can of course only have effect when there is a Bank within reasonable distance. We see, therefore, at the outset that the first step towards organisation of capital is the multiplication of Banks.

The system of Joint-Stock Banks is better than that of private Banks, because they offer more certain security to the depositor, and are less partial and more consistent in their method of distribution. Their greater security lies in the publication of their bi-annual audited statements ; in the fact that these accounts are critically checked and examined by professional auditors, nominated not by the management but by the shareholders ; by the supervision of Directors, also nominated by the shareholders, and by a system of checking and book-keeping which if properly superintended, ensures a correctness which is almost automatic.

Leaving for later review the formation of Urban Banks and Co-Operative Societies, I will first enumerate the principal considerations in the organisation of Joint Stock Banks. The foremost of these is sufficiency of Capital. It is a great mistake to open a Bank with a small Capital. A Bank to be an efficient collector and distributor of credit must be in a position to command, not solicit, credit. It must be in a position to lend large sums of money on loan if it expects to attract large sums of money on deposit. The Joint Stock Banking system would show no advantage over the Private Bank system if it did not tend to lessen the cost of finance. The yield per cent. on the capital alone will not cover the cost of establishment and charges. Just as an industrial concern depends upon the extra working capital acquired by loans, debentures, or accumulation, for making its profits, so a Bank must have deposits in order to yield profits. Moreover, the prime object of a Joint-Stock Bank is to utilize the unemployed cash balances of the community, or in other words to so organise itself as to attract such balances in the form of deposits. Modern Banking has formed deposits into two kinds ; those payable on demand and those fixed for a period. In a fully developed Banking system as is met with in the United Kingdom, it is unusual for Banks to allow

interest on Current deposits, the employment of Banks for collecting bills, storing money and making payments being almost a necessity, and if you look at the reasons as mentioned above why everyone should deposit their money in Banks, you will find that the convenience and security thus afforded are strong arguments, apart from national finance considerations, in favour of allowing no interest on Current deposits.

I wish particularly to impress upon you that there is nothing to lose in keeping money with Banks, while in convenience and security alone there is much to be gained. Indirectly the benefit is very great. By the deposit of daily surpluses in Banks, a fund is accumulated of money which would, if it remained in the hands of the depositors, be earning nothing. In the hands of a Joint-Stock Bank it represents a sum of money of which part must still be kept unremunerative, but secure, and the balance is available for investment.

The proportion available for investment and the method of investment are necessarily regulated by local circumstances and must be rigidly controlled by expert management. It would take up too much of your time were I to go into the details of Bank Management, and it will be sufficient for the main purpose of this address, to state that it consists of a perfect system of checking and control, the Auditors checking the Directors, the Directors controlling the Manager and the latter controlling the office, which again is under a graduated system of checking through the Accountant and heads of department.

I think I must have now clearly demonstrated the advantages offered by the Joint-Stock Banking system for the security and employment of unused capital. You will now wish for some demonstration of the advantages which the system offers for distribution.

The advantages I claim are, impartiality, continuity, and cheapness. A Joint-Stock Bank cannot or certainly should not engage in trade of any kind. No applicant for accommodation can or should come under disobligation by reason of the trade he is conducting. The only disobligation a

Bank can or should recognise is the applicant's bad character, want of means, or the insufficiency of his security. If the Bank is satisfied on these points, it can or should be no respector of persons.

A Bank must have a large capital and large deposits in order to efficiently fulfil its mission as a distributor of finance. It must be able to satisfy all reasonable applications for the finance of current trade at any time. Given sufficient working capital, every merchant, manufacturer, dealer, broker, or private financier should be able at all times to arrange his business with the certainty of being able to supplement his financial requirements by the deposit of marketable security, and also of being able to draw money from or remit money to other commercial centres without the trouble, risk and delay of counting, packing and transmitting coin or notes. Hence the Bank, as a distributor, facilitates and consequently stimulates profit-making employments and increase the communal sum of profits.

The terms of accommodation are regulated by the proportion of a Bank's reserve of cash to its liabilities, or to use expressions hitherto employed in this address, by the proportion of the unused balance of its working capital to the total sum. The more a Bank is recognised by all classes as a convenience and a safe custodian, the cheaper must become the terms of accommodation. Lest some capitalists may imagine that such cheapness would be an advantage to the active profit-maker only, I would draw attention to the fact that in every prosperous and progressive place, the capitalist who owns House and Landed property gains largely by the increasing value of that property, and moreover with progress many new lands may be brought into profitable use and new industries become possible, all of which offer advantages to the capitalist.

It is therefore in every way in the interest of capitalists that Joint-Stock Banks should be started where they do not already exist, and that capitalists should lead the way in encouraging the employment of existing Banks, and in establishing new ones in populous centres which are at

present unprovided or insufficiently provided. Only I would again repeat most emphatically that a Bank to do any real good must be strongly capitalised. It must not be promoted like a joint-stock industrial or mining company by a number of subscribers who sign applications with the intention of selling at a profit before allotment or repudiating their obligation if they cannot do so. The right sort of shareholders of a Joint-Stock Bank are capitalists or genuine investors, whose concern is rather for the general advantages to be derived hereafter from the Bank's existence, than for the dividends likely to be paid in the near future. The indirect advantages to capitalists of a strong and efficient Bank through the cheapening of accommodation and the increase of communal profits are infinitely greater than a difference between 5 and 15 per cent. in the dividends paid by the Bank. With such a class of shareholders, the first consideration of the management would be the cheapening of accommodation and the extension of business. There would be no hurry or necessity to play up to the depositing public by means of premature high dividends, nor would the shares for some time at least go into speculative hands. When a Bank is once well established and thriving, the class of its shareholders becomes of less importance, but in my opinion it is of the first importance that during the first few years of a Bank's existence, the shareholders should be investors who can afford to regard dividends as secondary to the general purposes for which the Bank is established.

There is only one more point that I would ask you to regard as important in the conduct of Joint-Stock Banks. It is absolutely necessary in order to secure a Bank's dominating position in the world of credit and establish undoubted confidence in the honesty of its management, that no one of its employees shall be engaged in any trade or calling outside the Bank, shall receive no *dasturi* or consideration money or commission directly or indirectly from the public in any form whatever, and also shall not individually enter into transactions for purchase of securities or property on his own account involving the borrowing

of money to complete the same. Men of brilliant intelligence and high financial abilities are not required to man the offices of Banks; but men of ordinary abilities are sufficiently competent provided they are honest and industrious. The scale of salary should consequently be such as to provide not only subsistence but as much more as will enable an ordinarily careful man to put by a sum each year and thus render him free from the temptations which poverty provokes. A Bank's service does not offer a fortune to any of its employees, and its chief attraction is the respectable and often influential position which a Bank appointment gives. That the public should so regard Bank officials is most desirable in the general interests of a Bank but high reputation and uncorruptible honesty must be paid for, and they are worth it.

As Joint-Stock Banks assist only those who have large or moderate monetary transactions, there remains to consider the vast population of working men whose wages seldom admit of their having any surplus in hand above their daily wants. The latter are more often in the position of requiring money than having money to put by. When they have any surplus, the Government Savings Bank offer fair interest and undoubted security, and I cannot conceive any better organisation than the Government Savings Bank for small savings. But the latter does not assist the agriculturist, artisan or clerk who wants to borrow, and who cannot offer the security which a Joint-Stock Bank must by its constitution demand. This difficulty has been met with considerable success in Europe by the formation of mutual help societies of various kinds, and as you are aware, the Government of India has taken the subject in hand with considerable vigour by passing the "Co-Operative Credit Societies" Act of 1903 and by authorising advances from the Treasury to a limited extent in support of such institutions.

The application of the Act to Co-Operative Credit Societies in towns as well as villages is so fully described in Sir Denzil Ibbetson's speech on the occasion of the introduction of the Bill in the Viceroy's Council that I cannot do

better than forward you a copy, and with this I also send you the Report of the Committee on the Establishment of Co-Operative Credit Societies in 1901 and the draft of the Bill as finally passed in 1903. For any further explanation regarding the formation of these Societies you should apply to the officer in your province holding the position of Registrar of Co-Operative Credit Societies as under any circumstances no such Societies can be formed to obtain the benefits of the Act, until approved and registered by him. Moreover, that officer should be in the best position to know and understand your local requirements and to advise you as to the form and rules most likely to be applicable to your communities.

Personally I can only write with experience of Joint-Stock Banking, but I firmly believe that much benefit is derived from Co-Operative Credit Societies and am much interested in hearing of their success.

In conclusion I cordially wish success to the objects which your Conference has in view, and I shall look forward to its being the precursor of many similar meetings not only in the fine old city of Benares but in other wealthy cities of India. I rest in the hope that however small my voice may be, the cry of "Advance India" may find an echo among those who have position, influence, and national aspirations, and will repeat it with a more far-reaching, sound and practical effect.

THE INDUSTRIAL DEVELOPMENT OF INDIA.

BY SIR GUILFORD MOLESWORTH, K. C. I. E.

India presents the strange spectacle of a country, formerly rich, prosperous, and in a manner highly civilized, of which the native industries are now decadent, being crushed out under the stress of modern civilization and progress.

Of India's vast population of 300,000,000 souls, about 60 per cent. are supported by agriculture. This leaves a large residuum available for other industrial purposes, but the

arts and crafts for which India has been so justly celebrated, whether metallurgical or textile, whether of cutlery, glass, pottery, silks, carpets, or other industries are dead or dying.

Throughout the country may be found old slag-heaps, testifying to the former prosperity of native iron industries, the splendid native iron being now superseded by cheap worthless metal of foreign manufacture. Everywhere may be seen evidence of flourishing industries of the past, whether in the huge forty-ton brass gun of Bijapur, in the great iron column of the Kutub, in the magnificent inlaid marble, the fretwork and the carving of the tombs, palaces and mosques. It may also be seen in the glass, pottery, shawls, carpets and silks in the toshikhanas of many of the Rajahs, and also in the ruins of indigo factories.

"Why keep India?" writes a shallow thinker in the *Contemporary Review*. "India is of no use at all to us. We should be richer, stronger, better and happier without it. We are cramped, distracted, and impoverished by it."

Lord Lawrence wrote in 1864 :—

"India is, on the whole, a very poor country. The mass of the population enjoy a scanty subsistence."

Lord Mayc wrote in 1871 :—

"I admit the comparative poverty of this country, and am convinced of the impolicy and injustice of imposing burdens on the people which may be called either crushing or oppressive."

Instances might be multiplied without number to prove the poverty of India.

In connection with this subject I may quote the following from an article which I contributed to the *Calcutta Review* more than twenty years ago :—"India, the land of the pagoda tree! India, the mine of wealth!! India, the wonder and admiration of Marco Polo, and of travellers of former times !! India in poverty!! Midas starving amid heaps of gold does not afford a greater paradox : yet here we have India, Midas-like, starving in the midst of untold wealth."

For India has untold wealth: wonderful natural resources, whether agricultural, mineral, or industrial, but they are to

a great extent dormant. It has coal of an excellent quality, it has fine petroleum, large quantities of timber and charcoal: it has iron, of a purity that would make an English iron-master's mouth water, spread wholesale over the country, in most places to be had by light quarrying over the surface; it has chrome iron capable of making the finest Damascus blades, manganiferous ore, splendid hematites in profusion. It has gold, silver, antimony, tin, copper, plumbago, lime, kaolin, gypsum, precious stones, asbestos: soft wheat, equal to the finest Australian, hard wheat, equal to the finest Kabanka. It has food-grains of every description: oil-seeds, tobacco, tea, coffee, cocoa, sugar, spices, lac, dyes, cotton, jute, hemp, flax, coir, fibres of every description: in fact, products too numerous to mention. Its inhabitants are frugal, thrifty, industrious, capable of great physical exertion, docile, easily taught, skilful in any work requiring delicate manipulation. Labour is absurdly cheap, and the soil for the most part wonderfully productive."

Ball, in his "Economic Geology of India," says:—"Were India wholly isolated from the rest of the world, or its mineral productions protected from competition, there cannot be the least doubt that she would be able, from within her own boundaries, to supply nearly all the requirements, in so far as the mineral world is concerned, of a highly civilized community." I may add that this remark is applicable not only to mineral products, but also to almost every other article of produce. The coal-fields, as far as they have been explored, cover an area of 35,000 square miles, and are estimated to contain 20,000,000,000 tons of coal. In Bengal and Assam there is coal nearly equal in evaporative power to medium Welsh steam coal, though inferior to Aberdare. In some parts of India the supply of iron ore is on a scale of unparalleled magnitude, whole hills and ranges of it being of the purest varieties. There are also available in India millions of potential Horse-power, in the form of water flowing from the mountain ranges, capable of being converted into electrical energy at generating stations near the hills, and conveyed with slight loss to centres even at

very great distances, where it can be utilized for industrial purposes.

There is plenty of capital in India. The amount of wealth now hoarded in the country has been estimated at about £550,000,000: but neither this, nor British capital, will flow to a market in which its operations are checked, and its struggling industries swamped by unlimited foreign competition.

British capital, for the most part, has been attracted only by heavy guarantees from Government. For many years the Government had to struggle against the adverse pressure of those short-sighted critics who have denounced it as "plunging the country into debt and inevitable ruin." There can be no doubt that at the outset the interest required for the construction of large irrigation works and railways put a heavy strain on the revenues of India, and it is only in recent years that it has emerged successfully from the ordeal. These works are now yielding a large and increasing revenue to the State, a revenue which to quote the words of Lord Curzon, has left India "better equipped to face the many problems which confront her:—stronger and better guarded on her frontiers, with her agriculture, her industries, her commerce, her education, her irrigation, her railways, her army and her police brought up to a higher state of efficiency, with every section of her administrative machinery in better repair;—with her credit re-established, her currency restored, the material prosperity of her people enhanced, and their loyalty strengthened."

Some of the manufactures of India under British capital, and especially that of cotton and jute, have increased, but it has been uphill work, and the development of these industries falls very far short of the magnificent potentialities of the Empire, and is not commensurate with the advantages which have been gained by the public works policy of Railway extension and irrigation works.

These have enabled the State to relieve some of that dead weight of taxation which burdens the agriculturists

by remission of land revenue, by advances to cultivators for seed, and by reductions of salt-tax and income-tax.

About three years ago, Mr. Nilkanth Wagle, B.A., read a very careful and able paper at the Society of Arts on the industrial development of India, in which he pointed out that some forty or fifty years ago, Japan was as backward as any Eastern nation, but that she had developed her resources "from within", or, in other words, by the people in conjunction with the Government; and he has quoted the advice given by Principal Dyer to the Government of Japan in 1887, showing that the want of faith which the people then displayed in industrial enterprise, prevented what money there was in the country being usefully employed, and that, until confidence had been established in the practicability of such works, it was necessary for the Government to take the lead, and give such assistance as might be necessary; taking care, however, to give it in such a manner as really to encourage private enterprise.

The success of this policy has been apparent in the wonderful development of Japanese industries. The Government of Japan brought out a very able staff of specialists, and drew out a scheme of technical education which included everything required to enable her to occupy her proper place among the manufacturing nations of the world; and native talent was not only educated, but employed in the different manufacturing departments which were the property of Government.

It is now the accepted policy of the Government of India to render India practically independent of external supplies as regards her army, by establishing Government factories in various parts of the country for the manufacture of arms, ammunition, clothing, saddlery, equipment and munitions of war. There is no reason why this policy should not be extended to her State Railways and other Public works, and to the needs of the country in general. There is no reason why she should not establish technical guilds, like that of South Kensington, in which the natives might first receive

technical education, and be afterwards apprenticed, and obtain workshop training and subsequent employment in the different State departments or factories.

There is no reason why the Government should not develop agricultural industry in the same way that it has embarked in forestry, using the lands reclaimed by irrigation. This might serve as a school of agriculture generally, and especially for the improvement of the staple of cotton. India formerly produced excellent cotton, but it has degenerated, and is now short in staple. The Inspector-General of Agriculture has declared that our knowledge of indigenous cotton is incomplete, and that its degeneration is not due to inferior cultivation or exhausted soil;—that the black cotton soil is very fertile, and he has attributed the deterioration in staple to the continuous use of unselected seed. Others say that the short staple is due in a great measure to careless and improper cropping. Be this as it may, there can be little doubt that if cotton growing had been fostered, the quality could have been improved, and the quantity increased, so that England would not now have been dependent on the speculations of American cotton rings for her supply. It is difficult to overrate the importance of agriculture in any country. Adam Smith has said:—"No equal capital puts into motion a greater quantity of productive labour than that of the farmer. Not only his labouring servants, but his labouring cattle, are productive labourers. In agriculture, too, nature labours along with man: and though her labour costs no expense, its produce has its value, as well as that of the most expensive workmen.....No equal quantity of productive labour employed in manufactures can ever occasion so great a reproduction.....The capital employed in agriculture not only puts into motion a greater quantity of productive labour than any equal capital employed in manufactures, but in proportion to the quantity of productive labour which it employs, it adds a much greater value to the annual produce of the land and labour of the country, to the real wealth and revenue of its inhabitants. Of all the ways in which capital can be employed,

it is by far the most advantageous to the society." (*Wealth of Nations*, Book II, Chap. V.) Adam Smith has rightly insisted on the great value of "internal" (or as he terms it "home") as compared with "external" trade. He says: "The capital employed in the home trade of any country will generally give encouragement and support to a greater quantity of productive labour in that country, and increase the value of its annual produce more than an equal capital employed in the foreign trade of consumption; and the capital employed in this latter trade has, in both these respects, a still greater advantage over an equal capital engaged in the carrying trade." (*Wealth of Nations*, Book II, Chap. V.) I cannot agree with those who argue that there is no market for the produce of Indian industry. As regards internal consumption, statistics of our imports show that there is large and increasing demand: and the very development of industries would increase that demand. Sugar, for instance, is one article which India is in a position to supply as cheaply as any country in the world; yet in 1903 sugar, probably bounty-fed, to the value of nearly £4,000,000 sterling has been imported into India. Twenty years ago the wheat crop of India was nearly 36,000,000 quarters or about 14,000,000 quarters in excess of the total imports of wheat into Great Britain for the year 1902: and in the Punjab alone there is cultivable waste land sufficient to produce 12,000,000 quarters, besides large tracts in Burma and other parts of India, only requiring irrigation or population to bring them under the plough. If India had, by preferential treatment with regard to foreign wheat, the inducement of a steady and certain market to grow wheat, there can be no doubt that her cheap labour and low railway rates could enable her to supply England with all the wheat she requires at rates as low as, if not lower than, those at which the United States now supply it.

The most important question at present is how to relieve, as far as practicable, the burdens on agriculture.

Capital is necessary for all industries, but, as I have already observed, it will not flow to those markets in which

its operations are checked, and its struggling industries are swamped, by unlimited foreign competition.

More than thirty years ago, Sir Lepel Griffin wrote an article in the *Fortnightly Review*, urging the great desirability of imposing duties in India to encourage Indian arts and manufactures, and for revenue purposes, and to raise the dead weight of taxation from the land. For this purpose he thought protective duties might very justly and beneficially be imposed on India. But the question should be decided, not on English grounds, or by English people, in England, but by the Indian Government in the interests of India alone.

It has been pointed out by a very high authority that, "whatever may be the merits of Free Trade, as a system suited to these or those national circumstances, it probably carries with it a defect of its qualities in inducing too great apathy towards the exertion of governmental action in trade matters. Non-intervention and *laissez-faire* may easily degenerate from a conservative principle into an indolent attitude of mind, and then it is politically vicious."

The imports of India are large, and a moderate duty on them, which would not be felt by the masses, would not only materially aid the development of India's industries, but would raise a revenue that would afford a much-needed relief from the dead weight of taxation on the land. Such a policy, at the outset, and during the stage of development might involve slightly increased cost: but there can be little doubt that eventually it would be productive of considerable economy and general prosperity, nor would it increase the price of food, for India, in addition to the food consumed in the country, now exports to other countries more than 78,000,000 cwts. of food grains, neither could it affect the small articles of general use for the native agricultural labourer.

Moreover, experience has proved beyond all doubt that protective duties, if moderate, do not increase the cost of articles taxed.

It may be taken as an axiom of political economy that, as a general rule, when an article is of home production (or in other words when it can be produced in the country) the tariff, if it be moderate and not prohibitive, stimulates production, promotes general competition, kills foreign monopolies, and in some cases actually reduces the cost of the taxed article.

But if the article be not one of home production, and cannot be produced in the country, if the tariff be so high as to be prohibitive in times of scarcity, the duty will increase the cost of the article.

Innumerable instances have occurred, both in the United States and also on the Continent of Europe, in which the imposition of a tariff has been followed by a fall in the price of the article taxed.

The *American Economist* of October 2nd, 1891, published a list of 11 articles in common use, all of which had been reduced in price after the imposition of the McKinley tariff.

Unfortunately, India's interests have been subordinated to English policy and to the extraordinary belief in the virtues of Free Trade, which has been generally held by the British public, until it was awakened from its delusion by the startling speech of Mr. Joseph Chamberlain at Birmingham, in May 1903; and England began to discover that, under the policy of Free Trade, Britain's commercial and industrial supremacy was waning, her agriculture ruined, her industries struggling hard for existence, and many of them, like those of India, crushed out.

The origin of England's belief in Free Trade is not difficult of comprehension. Great Britain had acquired her commercial and industrial supremacy, as well as her position as the great capitalist nation of the world under a policy of strict protection; and before the introduction of Free Trade in 1846 she commanded all the markets of the world; she had developed her coal, iron and textile industries and had a complete monopoly of them. Almost coincident with, but a few years before the adoption of Free Trade, an extraordinary era of prosperity sprung up throughout the whole

civilized world. This was due to numerous improvements in arts, science, and inventions as well as to improved communication by railways, steam navigation, and telegraphs, which made such rapid strides during the second quarter of the nineteenth century. All other civilized nations shared this prosperity, but England, from her position as capitalist, being first in the field, and having the command of all the markets in the world, was in a better position than any other nation to reap the advantage of this altered condition of affairs. She not only supplied manufacturing machinery and railway materials for the whole world, but, as capitalist, furnished the funds for every public work abroad, with the understanding that plant and materials of every description should be supplied from England. The value of her investments increased enormously with the rapid development of the countries in which they had been invested ; and she has been enabled to re-invest the interest on these investments, so that her wealth as a capitalist has become enormous, and must now amount to many thousand millions sterling. Then came the great rush of gold from the Australian and Californian discoveries, causing an expansion in the currency of the world, which is always accompanied by increased activity of trade.

The English people, generally satisfied with this rush of prosperity and wealth, accepted, without enquiry, the persistent claims of the advocates of Free Trade for this result, and this idea has been so thoroughly ingrained into the British mind that it has required no small moral courage to question it.

For a considerable time England with her great advantages, having been first in the field, was able to hold her own, but, as soon as foreign Protectionist nations were able to avail themselves of these new industrial conditions, they successfully competed with Great Britain, even in her own markets, and now England is flooded with productions of the very nations which she formerly supplied, crushing out her industries in the way that India's industries have been wrecked.

England now stands alone (excepting Denmark), as a free-trading nation, but the commercial and industrial supremacy which she once enjoyed is rapidly waning, and although she still remains a rich capitalist country, her wealth is almost entirely due to the enormous interest on the investments she has made in those countries which have since developed with the general advance of the world.

British colonies are becoming more and more Protectionist, and are flourishing under that policy.

In the United States the periods of protective tariffs have been uniformly marked by prosperity, and the periods following their several repeals have been marked by depression of trade and distress.

Direct taxation in England has more than doubled during the last thirty years, and is increasing with alarming rapidity. Mr. McKinley pointed out that Free Trade in England had increased the rate of taxation by over 24 per cent. between 1870 and 1880, whilst in the United States the rate had, during the same decade, diminished by nearly 10 per cent.

From the evils of Free Trade Germany has been rescued by the sound judgment of Bismarck, who said:—"We refuse to remain the sole dupes of an honourable conviction. Through the widely opened door of our imports we have become the dumping place of foreign surplus production, and it is this, in my opinion, that has prevented the continued development of our industry, and the strengthening of our economical conditions. Let us close our doors awhile, and secure for German workers the German market which hitherto the foreigners have exploited with connivance. The abstract doctrines of science influence me not at all; I form my verdict on the teachings of experience. I see that the Protectionist countries are prospering, and that the countries which practise Free Trade are decaying. Even mighty England is gradually returning to Protection, and will in a few years' time revert to it altogether, in order to save for herself at least the English market. Since we lowered our tariffs, we have, in my opinion, been a prey to consumption. We have been bleeding to death."

Bismarck gained his point ; Germany reverted to Protection ; and the policy has proved to have been eminently successful.

The term "Free Trade" (*Libre Exchange*) as exclaimed by economists, means free exchange of commodities between nations, which England never has had, nor is there the slightest probability that she will ever have it.

England has no free import of her productions into any country, not even into her self-governing colonies. She has thrown away her bargaining power with foreign countries, by abolishing tariffs on competing products, and has handicapped her trading relations with her colonies and dependencies.

The fiscal policy of England, though claimed by Free-traders to be based on the political economy of Adam Smith, is absolutely opposed to it. Adam Smith rightly devoted much argument against "monopolies," "absolute prohibitions", and "high duties which amounted to a prohibition," and he only advocated free import of corn on the assumption that the import of foreign corn would be so small that it "could affect very little the interests of the farmers of Great Britain." Of course he could not have foreseen that steam navigation and railways, which did not exist in his days, would enable the actual import of foreign corn to be 1800 times as much as that on which he based his conclusions.

He predicted the ruin which has actually befallen many of the British manufactures in the following terms :—"If the importation of foreign manufactures were permitted, several of the home manufactures would probably suffer, and some of them perhaps go to ruin altogether." (*Wealth of Nations*, Book IV, Chap. II.)

Both Adam Smith and Mill advocate the imposition of countervailing duties on those foreign nations which restrict by high duties or prohibitions the importation of produce into their countries.

In conclusion, I may add that in order to develop the industries and vast potential wealth of India, it is necessary—

(1) To develop India's resources from within, pursuing that policy which has been initiated by Lord Curzon—in the creation of a Board of Agriculture, a Board of Scientific Advice, a Commercial Bureau, and by the institution of Industrial schools, Technical scholarships and apprenticeships for workshop training.

(2) To improve the agricultural status, by the regulation of land revenues, by relieving the indebtedness of the agricultural classes, by advances to cultivators to enable them to purchase seed, by the establishment of experimental State farms which may form nuclei for the purchase or distribution of improved means and methods of agriculture.

(3) To relieve the dead weight of taxation from the land, and at the same time to attract capital, both native and English, by protecting industries from being swamped by unfair and unlimited foreign competition. For this purpose to adopt a policy of moderate and carefully considered import duties, which should not be prohibitive, but (as in the case of the Sugar duties), place Indian industries in a position to hold their own.

(4) To open external markets for produce with countries bordering India and to foster international and intercolonial trade by the exchange of mutual concessions and preferential treatment, which would be mutually advantageous.

(5) To improve the internal market either by the establishment of State industries, which will supply the requirements of the Indian Government, or by the purchase of Indian produce as far as possible.

(6) To give facilities to capitalists who may desire to start industries, for obtaining concessions, and for the acquirement of mining and other industrial rights, and to put a stop to the interminable delays to which the acquirement of such concessions is often subjected.

(7) To pursue that policy of railway extension and irrigation works which has been eminently successful in contributing greatly to State revenues, and consequently to the reduction of taxation.

(8) To promote trade, as far as practicable, by the adoption of the lowest possible rates for transport.

(9) To govern India, *not* on English grounds, by English people in England, but by the Government of India in *the interests of India alone*; and to resist the interference of the Home Government in any attempt to sacrifice Indian interests to the exigencies of English party politics.

India requires protection from England as well as from foreign countries.

SOME FACTORS IN THE INDUSTRIAL AND COMMERCIAL DEVELOPMENT OF INDIA.

BY RAI BAHADUR LALA BAIJ NATH, B. A.,
*Judge, Court of Small Causes, Allahabad, Fellow of the
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The last few months have witnessed an unusual development of activity in the promotion of the indigenous arts and manufactures of India, and brains once busy in solving political or legal questions, are now busying themselves in discussing economic questions. Capital once so slow in flowing in this direction is beginning to do so, and merchants and traders who used to deal in foreign goods so largely, have refused to give fresh orders. The movement is gradually finding its way amongst the masses and even Indian women are beginning to show a preference for Indian over foreign goods. Men of light and leading who were hitherto such great patrons of imported articles are now showing with patriotic pride Indian clothes upon their persons and Indian things in their houses. Shops for the sale of Indian goods are fast springing up everywhere—and factories, large and small, are being started for the manufacture of articles for which India had to depend upon foreign countries. That this is a matter for satisfaction to every well-wisher of the country is certain. But there are several

factors in the development of the movement which cannot be too prominently kept in sight and upon which the economic progress of the country so largely depends. They are (1) the sympathy and co-operation of the Government along with a much greater progress of technical and artistic education and development of a spirit of self-help among the people ; (2) improvement of the quality and increase of the quantity of raw material upon which the excellence of all manufactures largely depends ; (3) the conditions under which the artizan class of the country has to work, its social environments and organizations, and (4) the principles which govern Indian trade at present. All these greatly contribute to the economic progress of a country, and in India all these, as they exist at present, shall have largely to be strengthened or modified before we could hope to rival the countries of the west with their capital, co-operation and enterprize, in producing articles of necessity and luxury, in quantities as large and at rates as cheap as they. We in India have not only to labour under the disadvantages of poverty, want of organization and technical skill, but also under social conditions from which other nations with whom we wish to compete, are free, and greater therefore is the necessity of persistent effort in removing all that stands in the way of our progress.

I shall in this paper briefly discuss each of these factors and try to point out how they can subserve to the interests of the country as a whole. My remarks will be more with reference to the Upper Provinces which I know, but I believe the conditions in other parts of the country will also be found to be similar.

I. Government Co-operation.—The first essential of success in any undertaking, industrial or commercial in India, is the co-operation of the Government with the people. One cannot do without the other. In former regimes it was the Government and not the people who patronized the arts and industries of the country. In fact the latter owed their existence largely to Government patronage. The people were not of much account and whatever of art there was,

was because of the patronage accorded to it at the local court of the day. Nowadays this has greatly changed and the people are also coming to be a great factor in their commercial and industrial development. But the Government has still a very great share in shaping the future of all Indian trade and industry and shall have it so for some time to come. Unlike other foreign Governments which own no industrial or commercial concerns, and which only regulate the trade and commerce of their country, by proper legislation, the Government of India is the owner of enormous systems of railways, telegraphs, canals and opium factories, and has always taken the initiative in fostering new industries or reviving decaying ones. It now possesses some 28,000 miles of Railways costing some 240 millions sterling and a system of canals which irrigates 11 millions acres of land. In 1823 the East India Company which then ruled the country, granted special concessions to coffee planters to stimulate the production of that article. In 1819 it did the same with indigo. Large sums of money are invested by it in the silk trade and it introduced into the country the Italian method of winding silk. Its opium monopoly yields a very large revenue which cannot be got otherwise. Its model farms, agricultural schools, bureaus for investigating the methods of production of raw material and devising means for promotion of scientific and agricultural education amongst the masses, all show that it has long abandoned the doctrine of non-intervention with trade in its dealings with India. It has lately established a number of scholarships for natives of India who go to foreign countries to learn mining and such other industries as are of special importance to this country and has now a Member for Industry and Commerce in its highest council. Its Commercial Intelligence Department publishes from time to time correct information as to the various branches of commerce now flourishing in India, and its monographs on indigenous arts and industries not only furnish useful material to work upon, but also show the resources at command. It has now in contemplation the establishment of a large Agricultural College at Pusa and is actively

devoting itself towards improving the quality of Indian cotton on the initiative of the British Cotton Growing Association. Its imports of stores annually amount to more than a million sterling and any concern or industry which it patronizes is at once assured of success. It is therefore of the utmost importance that it and the people should move together in the matter of the economic progress of India. Without its help the task will be almost impossible of accomplishment.

The first thing in which the Government can help the people is protection of Indian trade and industry. Opinions differ as to whether free trade or protection is good for a country and the advocates of both will be found everywhere amongst thinkers and political economists. So far, however, as India is concerned, there never was any free trade before the advent of the British nor is it suited to the circumstances of the country. If India could at once start new industries in place of those which have disappeared under foreign competition, or if it could manufacture its raw produce into articles for home consumption and only export its surplus, free trade would have perhaps been good for it. But unfortunately it has now almost nothing but its raw produce to give to the world in exchange for the latter's manufactured goods and often receives its own products with enormous profits to foreign manufacturers. The loss of its hand industries has driven and is constantly driving a large population to agriculture and one famine means the increase in the number of those dependent upon an already exhausted and overburdened soil. Therefore while it may be of great importance to Europe to have free trade, especially in raw produce exported from other parts of the world, to India free trade whether in the matter of exports of raw produce or imports of manufactured articles from other countries, means so much more drain upon her already diminishing resources. The evil becomes greatly intensified in times of scarcity when grain stocks become exhausted in particular as enough is not left for home consumption. In such times free export trade means greater misery to the Indian masses, and the question of regulation of export trade of grain often engages

public attention. It is true that there has been a rise of some 25 per cent. in the wages all round in India, but along with it, there has been more than a fifty per cent. rise in prices of all food stuffs during the last 25 years, so that the ordinary agriculturist or artizan is not much better off, on the contrary he is much worse off than before. There is no free trade in America or Germany, two of the greatest manufacturing and trading countries of the world after England. There is also no free trade in most British colonies in spite of the protests of English statesmen. The Goverment of India does not, moreover, leave the Indian agriculturist or landholder freedom of contract and by legislation reduces the interest upon the loans of the one and regulates the sale of the lands of the other. Sometime ago it levied countervailing duties to prevent the indiscriminate export of bounty-fed sugar into the country from foreign markets. It is therefore of the utmost importance that in the interests of the Indian agriculturists, who form about 66 per cent. of the population, export of grain should be regulated by proper export duties, and, in the interests of the Indian artizan, whose trade is fast declining, imports of manufactured articles from foreign countries, by proper import duties. In the one case it means less taxation and in the other greater incentive to home manufacture of articles for which India has to depend upon foreign markets. The direct action of Government in the development of Indian manufactures is seen in its factory laws and regulation of hours of labour. But I need not say much upon this question, because by far the largest portion of our industrial population still lives upon hand industries, and is not much affected by such laws. The question of excise duty upon cotton manufactures is also another instance, and it is said that the imposition of such a duty seriously hampers Indian manufactures. But as the land industry is free from any such duty, it need not be discussed here. The tariff should be capable of automatic adjustment as in France, so that in times of emergency it may be reduced or increased.

All that need be emphasized here is that the Government having repeatedly declared itself to be in favour of the

progress of Indian arts and manufactures and having of late patronized several Indian firms by purchasing their goods for the public service, as well as by devoting greater attention to the matter everywhere, the resources at its disposal will, it is hoped, be even more largely applied in order to assist the people towards fostering the commercial and industrial progress of their country.

II. Improvement of the Quality and Quantity of Raw Produce.—This ought to be the first to engage the attention of the Government and the people alike. The pressure upon the soil is constantly on the increase on account of increase of population, and lands which 25 years ago yielded a maund of grain, do not now yield half that quantity. All the available lands of a village are taken up for the cultivation of either food grains or stuffs which find a ready market and little is left for pasturage of cattle. The rainfall of the country is getting very precarious every year and men and cattle are always on the verge of famine in some part of India or other. The condition of the great mass of our peasantry is a subject of anxious consideration to both the Government and the people and measures are constantly taken to assist the farmer, but not with success. Says Mr. Crooke—"There is perhaps no more pathetic spectacle in the whole range of human history than to watch these patient masses tumbling in their traditional way along a path which can only lead to suffering, most of them careless of the future, marrying and giving in marriage, fresh generations ever encroaching on the narrow verge which separates them from destitution. Anxious statesmen peer into the mists which shroud the future and wonder what the end of all this will be." (*North-West Provinces*, pages. 173-174.) Those who think that the hardship and suffering experienced by the poor of other countries are unknown in India except in periods of famine, forget that it is not in the nature of our people to complain or make themselves troublesome to their neighbours or the authorities as do the unemployed of other countries, and their sufferings are therefore not so publicly known as of the latter. But that

the country is getting poorer every year and the pressure on the soil is increasing are facts which can scarcely be denied. There is here no diversity of occupation worth the name. Agriculture is the only means of subsistence not only to the many who have always lived upon it from time immemorial, but also to the many to whom ruin of hereditary industries has left no other occupation but agriculture to follow. Lands which ought to be fallow are thus tilled for what they can yield. Cattle fodder is getting so scarce, that in the Batesar fair in the Agra district grass was sold at 16 seers per rupee, the price charged for grain, and many a trader in horses had to return with an empty pocket even though he sold one or two of his best breed. In the Agra district cultivators are now feeding their bullocks not only upon leaves of trees but also upon choppings of Babul thorns as I was told by the people of my own village there the other day. Every new legislation devised with the best intention, whether in the interests of the landlord or the tenant, is increasing litigation, and what with an increasing population, an impoverished soil having to support an ever increasing mass of people, increase of wants due to advent of cheap articles of luxury, increasing expenses on marriages and other ceremonies, increase of drunkenness in several parts of the country, the prospect is not at all good to contemplate. 'With the exception of a few large towns like Bombay, Calcutta, Delhi, Cawnpore, the majority of our towns are so many collections of hamlets with more of an agricultural than an industrial population, and even in large towns which are considered to be large industrial centres, the agricultural element largely preponderates. In villages, on the other hand, all hand industries are in their primitive condition as they were a hundred years ago. Each village has its own weaver, carpenter, potter, barber, and blacksmith, supplying its little needs and receiving his customary allowance of grain at each harvest as he did in times past. But the cultivator has not only to meet the demands of these but also of his Banya who has him in his clutches from generation to generation. He is thus left without anything to fall back upon in times of

scarcity, and I have seen in several villages of these parts in the coldest weather of the year that he has to go without a rag upon his person. In some of the permanently settled districts he is comparatively better off. But there he ruins himself by indulgence in shows and litigation. In my own experience in the Ballia district of these provinces, agriculturists, who own lands yielding as much as 60 maunds of grain and worth as much as 600 or 700 rupees per bigha, living upon two pice worth of *sattu* (parched rice or barley), and yet emptying their purses before legal practitioners and fighting for years up to the High Court for every *dhur* (240th part of a bigha of land). All this requires the most careful attention of the Government and the public alike. We do not require to increase at one stroke the productive power of the land by ten or a hundred or two hundred per cent, as in Europe or America. Foreign methods of cultivation have been found to be entirely unsuited to India. All that we can do in the face of the present condition of our people, their poverty and want of education is to give them such methods of agriculture as they can assimilate. The needs are elementary education in village and district board schools, and better training in provincial agricultural schools working in harmony and with knowledge of the agriculture of the province, better and more plentiful supply of water through canals, wells and tanks erected in each village or for each group of villages, better cattle and more manure. Too great attention cannot be directed to the question of well and tank irrigation, and where the Government does not undertake such works, landlords and cultivators ought to be encouraged to undertake them by being assured in practice as they are in theory against enhancements due to such improvements. I have specially noticed this in the permanently settled districts where pucca wells and tanks are more common than in temporarily settled ones.

The Government has an Agricultural Department in each province for agricultural research as well as for showing to the people improved methods of cultivation. But its methods are too expensive, as well as generally inaccessible

to the majority of our people. The department shows improved implements of husbandry, water lifts, sugar mills, at district shows, distributes acclimatized seeds and trains zamindars and students as licentiates in agriculture. But its efforts scarcely touch the great mass of the people, because of its being located in one central place as well as of the expense involved. If it had more farms and operations in the districts as in the Central Provinces, it might do better. Even as they are, its schools have done some good. Those of the students who have been trained in its school in Cawnpore are doing good work as practical agriculturists. One of these is now having a farm for improved cultivation of wheat in Ghaziabad ; another is raising better qualities of Indian corn, barley, potatoes and other stuffs by ordinary methods better supervised in Meerut. A third is having a good business as a seedsman in Sisoli. If, therefore, more zamindars were induced to send their sons to be trained in this way, they will vastly add to the value of their estates as well as make themselves independent of Government employment, which they so much hanker after.

The great drawback in all Technical education in India is the paucity of fields of employment for those who receive it, and it is worth consideration whether special inducements should not be held out to graduates and undergraduates of our Universities to qualify as agricultural experts by allotting to them a number of Tahsildarships and other posts in Government service where they could come in direct contact with the agricultural population, as well as employing them more largely than heretofore in the management of estates under the Court of Wards or large zemindaries controlled directly or indirectly by Government.

The improvement of the breed of cattle employed in agriculture ought also to engage the attention of all who wish to improve the productive power of the soil. Every famine or season of scarcity reduces the number of such cattle or leaves them impoverished and almost unfit for work. As cultivation advances, the area of fodder crops becomes less. Therefore even in good years there is not much for cattle to spare,

In bad years terrible is their fate. In this way their number is now not even $\frac{1}{4}$ th of what it was twenty years ago. With the decreasing number of cows and buffaloes, the supply of ghee and milk both in towns and villages is decreasing every year, and no manure is left for fields in the village. The Government keeps stallions in parts of these Provinces for improving the breed of horses. I should think bull stallions are more necessary for improving the breed of cows and bullocks and the matter deserves serious consideration on the part of all who are interested in agriculture.

In former times when Brahmani bulls used to be let off, the supply was better. Nowadays it is difficult to find good bulls in many a village. At most district shows in these provinces, while the number of horses and mares shown as well as their breed is very decent, the number and breed of bullocks is very poor. The ordinary cultivator or zemindar has no inducement to improve the breed because he knows that he will scarcely be able to secure a good price for his bullocks as he would for his horses. If at each show it were made a point to award as many prizes for good bullocks as for good horses, some improvement would at once result.

Fodder crops should, moreover, be encouraged in all cultivated areas by remissions of rent or revenue, and in times of famine not only men but cattle should also be relieved from starvation.

The next great drawback in the improvement of agriculture is the want of manure. The ordinary agriculturist cannot get any manure except what he collects in his own house. In the vicinity of towns night soil manure is always available and is highly prized. Not so in villages where the quantity of refuse collected in houses is very small and each has to use his own. Leaves of trees or oil seed cakes which are also good for the purpose are used for cattle to eat, and thus the majority of the fields have to go without any manure at all from year to year. The increase of cattle employed in agriculture as well as the planting of such trees whose leaves

supply such manure is therefore of great importance, and all owners of landed property cannot too carefully attend to them.

The fact is that without improvement of agricultural produce, no improvement in arts and industries is possible in a country like India. What with ever changing assessments of rent and revenue, and an overburdened soil supporting an ever-increasing population the outlook is not very promising. The last census shows the great inequality in the distribution of the Indian population, for while two-thirds of the latter live in a fourth of the whole area, only one-third live in the remaining three-fourths, and while in parts of the United Provinces and Bengal we have 600 persons to the square mile, in other parts like Rajputana we have only five. In the former, unless the productive power of the soil is soon increased by better farming or people migrate to less populated tracts their misery will always be great. "That agriculture is the foundation upon which rests the whole economic structure of India is nowhere so plainly revealed as in the export trade, and its remarkable expansion during the last four years, for putting aside gold and other minerals of which a few like coal, salt, saltpetre, petroleum, mica and manganese have been developed beyond a rudimentary stage and none of which figure prominently in the export trade all, save an almost negligible fraction of the raw produce and articles mainly unmanufactured which form the great bulk of exports of India and of the material for the comparatively small export of manufactured articles, are provided by its own husbandry, pasturage or forests." (Review of the Trade of India for 1904-05, page 2.) Our concern is, however, not so much with exports as with home consumption and home industries, and for them improved agriculture is of even more vital importance than exports. So greatly attached to the soil are the people of this country that they would not migrate to less populated parts of their own province, much less to colonies outside India, if they could help it, even though they see those of their fellows who had had the courage to do so,

coming laden with wealth in a few years. I have specially noticed this to be the case in the most thickly populated parts of these provinces, where I have found people ruining themselves by years of litigation for every inch of land and though left penniless, seldom leaving their ancestral village. In this way only ten per cent. of our people are found outside the land of their birth, and the necessity of agricultural improvement becomes therefore all the more apparent.

I need not specify the kinds of produce which require to be produced in larger quantities than heretofore. Rice, wheat, gram, pulses, fodder, grains, maize, sugarcane, are all as necessary as cotton or jute, and the attention of the patriot or the lover of progress in India should be steadily directed towards improving the quality and quantity of each of these products.

III. Improvement of the Training of the Indian Artizan is also as necessary a factor in our economic progress as the improvement of the status of the Indian agriculturist. The figures of the last census show that out of every 10,000 persons in a village, while more than 7,000 are landlords, tenants and agricultural labourers, the remaining three thousand live by simple hand industries of which those employing more than 100 persons are owning cattle and selling milk, fishing and plying boats for hire, oil pressing, basket making, and cotton spinning and weaving. Carpenters and blacksmiths also form a fair number. In towns, the number of persons dependent upon agriculture is much less. There we find about 4,000 out of 10,000 living by preparation of articles of food and drink and supply of material substances and about 1,200 by commerce. In large cities like Delhi, Ahmedabad, Amritsar, half the population lives by the supply and preparation of such substances because of the growing mill and other industries there. In Bombay one-seventh of the population lives by working in mills, while the Jute mills of Howrah support one-eleventh of its total population. This shows how important it is improve the status of the artizan for the purpose of our economic development. The ordinary artizan, be he a smith, a weaver, a carpenter, a mason, a

painter, or of any other trade, though not without skill and always possessed of much patience, is generally without any education or organization worth the name. Working with tools which are often worn out or are out of order, and wedded to methods of work at once crude and primitive, it is a wonder he turns out the work he does. His habits are simple and contented and he goes without showing any inquisitive turn of mind. His work, unless carefully supervised, is however generally unmethodical and unpunctual, and he has therefore to be content with far less wages than his English or even his Chinese compeer. In his anxiety to produce cheap articles now required by the trade or pander to the taste of his foreign customers, he is fast losing his old artistic designs and adopting artificial ones to the ruin of his trade. His secrets of trade are never published to the world but descend from father to son or master to apprentice, and his trade even in his own specialities is declining both on account of not keeping pace with the progress of scientific education amongst the artizans of other countries and its application to arts of life. Clever in the rule of thumb, he requires his eyes and hands to be largely trained before he can dispense with his rule and compass. Wages are rising everywhere and the demand for not skilled only but also for ordinary labour in each profession is greater than the supply. A good carpenter or blacksmith can get from Rs. 25 to Rs. 30, an ordinary one from Rs. 15 to Rs. 20 a month. But while thousands of young men with matriculation certificates will be available for even Rs. 10 or Rs. 15 and many a graduate for Rs. 30, it will be difficult to get a good carpenter or blacksmith for that sum. The reason is that hand labour does not possess the same dignity in India as it does elsewhere. Here a clerk or accountant or one who follows a genteel profession and slaves at it all his life in an office, is looked upon with greater respect by his countrymen, than a carpenter or blacksmith or mason unless he happens to be very rich. A Deputy Collector who does not rise to Rs. 800 even after 25 or 30 years of service and who has to be at his desk all day long, is much more honoured than a merchant whose

income is five times that sum. Government service in India has a charm which it has nowhere else. This accounts for the inattention of our people to artistic professions. The times are however changing.

In Bombay the Parsis are fast qualifying themselves as engineers, mill managers and superior artizans. In the Punjab the Tarkhans (carpenters) are also coming out as engineers, and it appears that the dignity of labour will soon be recognized in the country. This low estimation in which the artizan class is held is partly due to the place assigned to it by Hindu and Mahomedan religious traditions and partly to the want of education and the absence of regular scientific training possessed by the majority of our artizans from time immemorial. Caste prejudices are also great factors in this respect, and in communities and institutions where they are not recognized, the inmates soon prove better artizans than those of the bazar.

The first thing, therefore, necessary is to improve the theoretical education of the Indian artizan. There are at present several Technical and Art schools in India. But they do not attract students from the artizan class, because the system of instruction is not in touch with the habits of the people. Amongst them the old system finds more favour both on account of its comparative inexpensiveness as well as of its not involving separation from family at an early age. Under this system a boy is apprenticed at his father's or at a relation or friend's shop at the age of eight or ten. He is given the rougher and more elementary portions of the trade to begin with and acts as a menial servant. As he advances in knowledge of work, he is given the finer and more complicated portions till he takes his proper place in the firm. In this way hundreds of our lads are trained in shops and factories without any cost to their parents and with no indentures and prove useful before they are out of their teens.

The system has, however, this disadvantage that the pupil cannot become a greater and more skilled workman than his master and the trade thus remains where it was. What is

required is to adapt this system of apprenticeship to modern scientific education in Technical schools and institutions. We have the Victoria Jubilee Technical Institute and the J. J. Art School of Bombay for higher technical and artistic training. They are doing much good work, and similar institutions are required to be established in all the chief trade centres of India. We also require Technical and industrial schools in each district managed by its local and district board with workshops attached and working in harmony with the artizans of the place, recognizing and patronizing those who come to them for such recognition. In this way technical and industrial education will soon gain in popularity, and the very fact of recognition by a Local or Municipal Board or the Government will make the scheme a success. In Bengal they have about 28 Industrial schools of which only 6 are maintained by District Boards and one by the Government. The average attendance is about 105 and the cost to Government about Rs. 4,500 and to Local Boards about Rs. 18,000 or Rs. 19,000. In the United Provinces there is no school under any Local or District Board and only one Industrial school at Lucknow with only 98 students of which two are sons of artizans. The total cost to Government here is about Rs. 10,000. In Madras they have a School of Art as well as a number of District and Local Board schools with a cost of some Rs. 75,000 to the Government. In Bombay there are about a hundred of such schools with several Institutes possessing a large number of pupils. These institutions are, however, not so managed as to be in touch with the habits and traditions of those for whom they are intended.

The fact did not escape the notice of the Committee appointed by the Government for the promotion of Industrial education, who in para. 57 of their Report, said: "The prospects of industrial progress in India must, for many years, largely depend upon the attitude adopted by the handworkers of the country. For these instruction and improvement can only be satisfactorily secured by enlisting the sympathy and co-operation of their leaders, without any attempt to

break suddenly with the methods and organizations that have for centuries controlled the progress and destinies of the craftsman". As matters stand, each trade in India now forms a distinct caste or class and distinctions which to a foreigner seem unmeaning or absurd, are here observed with a rigidity unknown in other countries, preventing the members of one trade from taking up the occupation of another. Without going into the question of the functional origin of caste it may broadly be stated that while cultivation of the soil and field labour are open to all and can be followed without restriction by the highest as well as the lowest, the same is not the case with handicrafts. There one can take up only a craft which is not prohibited by his caste rules. A Brahman can, for instance, act as a priest, a water-bearer, a cook, a watchman, a peon in an office, or as a labourer breaking ballast on the road or carrying loads, but never as a smith, a carpenter, a cobbler, or a fisherman, and when some time ago, two Kashmiri Brahman brothers of Agra broke through trammels of caste and apprenticed themselves to a leather factory in Cawnpore, great was the howl raised by their people. They, however, withstood it manfully and came out as experts in leather and the opposition, be it said to the credit of the good sense of their community, died out. In other communities, more unreasonable, they would have been outcasted for ever. The same applies to Kshatriyas, Vaishyas, Kayasthas and other superior castes. None of them except inmates of institutions where these restrictions have been relaxed, can take up any occupation not followed by his community. Amongst the lower classes the number of professional castes is quite bewildering and each branch of a trade has come to constitute a caste with strict rules as to inter-marriage and interdining which no one is at liberty to break. For instance, amongst workers in metals, the goldsmiths are a distinct caste from the blacksmiths, the braziers from the *thateras* who repair old vessels, the *mochis* who prepare harness from the *chamars* who skin cattle or tan leather, the *kewats* (boatmen) from the *dhiwars* who are fishermen. Thus an oilman can only have the option of taking up field-

labour in addition to his own trade, so also can a washerman, a weaver, a dyer, a chamar. He cannot take up the work of any other trade without incurring social disability. In some parts of these provinces, for instance in the eastern districts, trades which are followed in the western districts by the three higher castes can only be followed by special castes. The confectioners in the western districts may be Brahmans, Kshatriyas or Vaishyas, in the eastern they form a separate caste. On the other hand, some of the professional castes who claim to belong to one of the higher castes, and even observe their rules, are not allowed to mix with the latter, nor is a member of any of the higher castes who takes to their business, allowed to mix with them. Thus a carpenter who calls himself an Ojha Brahman, a grain parcher or tailor who calls himself a Kayastha, a toddy drawer who calls himself a Vaishya, is not allowed to mix with the members of these castes proper, nor is a member of these castes who takes to the profession of a carpenter, a tailor or toddy drawer, admitted into the fraternity of the latter. Amongst Mahomedans also there are occupation-castes like those of tailors, dyers, water carriers, musicians, drummers, wire-drawers, engravers, but they are not so rigid as amongst the Hindus. On the contrary a couplet is often cited to show how with the increase of one's prospects in life one can rise from class to class and be ultimately recognized as belonging to the highest. "I was formerly a weaver, then I became a Shaikh, as grain becomes cheaper I shall become a Syed." Instances of this are within everyone's recollection in these provinces, and I know of a most charitable gentleman who was a butcher in Meerut, coming to be recognized as a leader of the Mahomedan community of the place on account of his wealth and public spirit. His parties were attended with pleasure by the highest and the best amongst both his own people as well as amongst Europeans. His habits were simple and his charities very large. His brother who is just dead, was after his brother's death, made a Companion of the Indian Empire and his successors are now the foremost people amongst the Mahomedan society of Meerut. In other

parts of the country, for instance in the eastern districts, with the weavers of Mau and Mubarakpur, and parts of Azamgarh, this is also the case. Amongst Hindus, it must be confessed with regret there is no such liberty, and a chamar of Agra who had amassed wealth in trade, although he became a good manufacturer and employer of labour from castes superior to his own, was not recognized other than as a chamar. The Mahomedan has also the advantage of a better physique due to his not marrying so early as the Hindu and but for his spendthrift habits he would be a much happier man than now. In Delhi, Agra, Benares, Azamgarh, the best weavers, painters, enamellers, engravers, carpet makers, embroiders, bookbinders, pyrotechnists, will be found amongst the Mahomedans. Some of them have earned rewards and medals in exhibitions held outside India. The Hindus also excel in some trades such as goldsmiths', setters of stones', potters', &c., but, generally speaking, there is more artistic skill amongst the Mahomedans than amongst the Hindus. In clay modelling the Hindus of Delhi have shown special aptitude and a potter, Ghazi, there got so famous for his models that he could make a life-size figure true to nature of any object, animate or inanimate, by merely seeing its reflection in water. In wood carving also the Hindus still hold their own against the others. In commerce they are better off, and the Marwaris, the Vaishyas, the Khatri, the Bhatias lead the market everywhere, and only those branches of commerce which they cannot take up, for instance, those dealing in hides or bones or leather, are left solely to the Mahomedans. In Upper India, with the exception of the Punjabi Mahomedans, and in Bombay with that of the Memons, Bohras, and Khojas, who are Hindu converts, the trade is all in the hands of the Hindus, because in commerce caste restrictions are not so rigid as in industry. There the follower of one branch is allowed to mix with the follower of another provided he is of the same caste. All these trades and professions as well as branches of commerce have their Panchayats and unions, some strong enough to regulate the course of trade in their community, others merely concerning them-

selves with caste matters. Some of these institutions are very powerful. The Marwari Chamber of Commerce or Panchayat everywhere leads the local market. In Delhi the cloth merchants' Panchayat saves every one of their members who is about to fail and who places his assets at its disposal, from being ruined by litigation. In Ahmedabad, a section of the Vaishya community who are large mill owners, on my initiative, at once started a powerful association for helping the people of the caste. In Amritsar, the Nuriagot Vaishyas regulate the piece-goods trade of the place. In Cawnpore the brokers and the commission agents would not accept the terms of the Marwaris, have lately formed themselves into a large joint stock company and have brought the Marwaris down. In Agra the cloth merchants have an organized system of charity. In Meerut the grain-dealers levy a certain percentage for the relief of the inmates of our orphanage. Amongst the lower classes Panchayats are even more powerful institutions, but only in caste matters, except it be in places like Lahore or Ahmedabad where some of them flourish in the shape of trade guilds and regulate the course of trade. All this has its good as well as its bad side. It secures specialization in trade and preserves trade secrets. But it also encourages narrow-mindedness and caste prejudice and seriously hampers progress. In some cases where the spirit of exclusiveness is very strong it threatens destruction to the trade, and instances of a once flourishing profession being now found amongst a few decaying families are everywhere common. This institution of divisions which now constitute so many castes, is now too deeply eng rained in our social polity to go for many years to come. If it can only be relaxed by making at least those of a trade who follow its separate branches, mix and work together and freely exchange professions, as in commerce, a great step will have been gained. More than this it would be premature to hope for.

The matter was carefully discussed by the Industrial Education Committee and they were also of opinion that in order to make the system of supervision of hand industries through a staff of experts entertained in each province suc-

cessful, we must work in co-operation with the Panchayats of each trade, and that measures taken in co-operation with such Panchayats would be far more popular and be received with far less suspicion than those taken independently. Those who know the feelings and habits of our people can testify to the truth of this, and it has been found in practice, as in our own Vaishya Mahasabha, that any scheme of co-operative trade or banking undertaken with the help of our own members, is more successful and dispenses with the necessity of appealing for outside help, than any which seeks to bring all the castes together. The same is the experience of many European thinkers also, and according to them caste shall always have to do largely in every system of co-operative trade or manufacture. Much as we regret their exclusiveness, we have to take these forces into account and work with and not against them.

What is next required is a complete industrial survey and a complete system of technical and commercial education. The lines suggested by the Industrial Education Committee in respect of the latter are (1) the appointment of a Director of Industries and Industrial Instruction ; (2) research, experiment and instruction under his guidance in textiles and silk in Bombay, metal work in Madras, pottery and Chinaware in the Punjab, glass making in the United Provinces, sericulture in Burma and the Central Provinces, and lacs, tans and dyes in the Indian Institute of Science ; (3) advances to artizans who are willing to train apprentices ; (4) revision of the law regarding indentures of apprentices ; (5) training of artizans in Railway workshops, gun carriage factories, dockyards, harness factories and presses belonging to the Government ; (6) recognition of private firms and giving them Government orders on condition of their training apprentices ; (7) prescribing tests for industrial skill in consultation with committees of heads of trades, and (8) guarantee of interest to private individuals who start new industries on the capital employed. For each province they recommended the appointment of a Chief Inspector of Industries and under him of persons skilled in each of the principal industries of the province,

the training of such inspectors in the Institutes of Industrial Experiment as well as in Engineering Colleges, the recognition of firms willing to train apprentices under a system recognized by Government, the encouragement of trade guilds and the carrying out of the work of technical instruction in workshops through them as well as through the Panchayats of each trade and the establishment of night schools for the instruction of artizans engaged in work during day time. This scheme has not yet been carried into effect. I should think that even if the portion regarding the recognition of certain workshops in each town for training apprentices, by giving them Government, Municipal and Local Board orders, be sanctioned, much good will at once result. Speaking of the United Provinces there are large tracts of the country in the Etah and Bijnor districts where material for glass making can be had in unlimited quantities and where any experiment in this branch of industry will at once show how we could save a large portion of the money that now goes out in the purchase of glassware from other countries. India imported in 1904-05 glassware worth more than a crore of Rupees, and it is a matter for serious consideration how at least a portion of this money could be saved by making if not the finer, at least the rougher kinds of ware, by utilising the services of men already trained in that work, locally. The same applies to many other industries, especially cotton, sugar, lacs, tans and dyes. Here also we have abundant raw material in the country and all that is necessary is improvement of quality in such manner as to compete with foreign manufacturers, if not in all, at least in the rougher kinds.

But even more important than the establishment of research institutes is an industrial survey for the whole of India. The matter was urged upon the attention of Government by Dr. Forbes Watson as far back as 1872. He was of opinion that "each kind of produce must be accurately described, the different varieties distinguished, the places and methods of production ascertained, the industrial and commercial value investigated and the question of supply and utilization discussed. And when all this has been done, provision must

be made for rendering such knowledge easily accessible and available for immediate reference not only by Government authorities but by agriculturists, manufacturers, and men of business generally." The work could not, according to him, be undertaken by any private body but by the Government. "Such a knowledge of the country as is here demanded for India is in Europe the accumulated result of the efforts of many successive generations, the work of legions of pioneers of enterprize who pushing on from experiment to experiment and from failure to failure have revealed to the country by their final success the secret of its resources. The whole of the advanced portion of Europe is in consequence of the development of commerce covered by a network of private agency, the express purpose of which is to indicate to the consumer the best sources of supply and to offer to the producer the means of realizing his products. A similar organization exists of course in India also, but only in a rudimentary state and restricted to a few principal towns and to a few of the principal staples, although no doubt it would grow in time by its own efforts. To shorten, however, in India the period of preliminary trials and unavoidable failures, and to hasten the advancement of the country appears to be in the power of the Government which although unable to take the place of private enterprize, may promote enquiries which will facilitate the task. Public, as distinguished from private action assumes, therefore, in India much larger proportions than it does here, and this has always been admitted to be the policy of the Government of India. Much has already been accomplished in respect of opening the country by means of information. The trigonometrical, topographical, revenue and geological surveys have been undertaken on a scale of perhaps unprecedented magnitude. It remains to complete the industrial survey which shall take stock of all the various productions of the country, agricultural, forestal, pastoral and mineral, of manufactures, of the localities of production, of the varieties, qualities and values of the produce, its supply and mode of distribution and consumption." Much good and

useful information on these points has since been made available by the *Dictionary of the Economic Products of India* as well as by the various Gazetteers, Imperial and Provincial, and special monographs published from time to time by the Government. But there has been no complete Industrial Survey of the country yet. The work is one of great magnitude, and every patriot should do his best, at least for the sixteen industries of cotton, vegetable oils, leather, iron, fish, wood, fibre, pottery, sugar-cane, dress, tea and coffee, milk, minerals, masonry and silk. Amongst those who claim immediate attention are the oilman, the potter, the leather worker and the fisherman, and last but not the least the weaver. Such a survey cannot be undertaken too soon and should be undertaken by the associations for industrial advancement. It would perhaps facilitate work were committees organized in each province with district committees working under them. And even though the information collected be not so complete as that collected by Government, yet it will encourage a spirit of self-help and research and at once give some impetus to both local and provincial enterprize amongst the people in the directions most needed. The information will, perhaps, be more popular than any published by the Government and should be collected as soon as possible. Directories of not only mill and factory industries, but also of the principal hand industries of each place should be prepared on the lines indicated in Dr. Forbes Watson's paper, and the names of the chief manufacturers noted and their prices given. Such directories will be of great use to those who do not now know where a thing required can be had, of what quality and at what price. If the Indian Industrial Conference publishes such a Directory even for each province every year or two years, it shall have amply justified its existence. India, which has hitherto had hand labour guided by custom, is now face to face with steam and electricity guided by experts. Ignorance and idleness are now pitched against organized skill and science, and it will tax her resources to the utmost before she could hope to come out of the struggle well. We cannot and ought not to do away

with our hand industries, our artistic designs and exquisite patterns which have always challenged the admiration of the world. But we shall have to adapt our hand industries to the times and so mould our manufactures and commerce as to save them from further destruction under foreign competition. In Europe trade is now conducted under keen and fierce international competition and each nation has to be as businesslike, as thorough in trade and manufacture as in war before it can hope to hold its own against its neighbours. India shall also have to realize the fact sooner or later. One great complaint against the Indian method of doing business is that it is very unbusinesslike. Unpunctuality, want of uniformity of quality, short lengths, short weights, absence of fixed charges are some of the complaints made, to the great detriment of native trade. All this shall have to be largely modified before our traders can command the same confidence in the trade market as other people more punctual and more businesslike than they do.

Experience shows that unless carefully supervised the work of an Indian workman, is unmethodical and indifferent in quality and constantly diminishes in quantity. Many an Indian or European who would gladly patronize an Indian firm, is forced to go to a European because although the prices charged are higher, there is more punctuality and honesty in dealing. Amongst the higher ranks of the trade there is as much honesty amongst the Indians as amongst other people, but it is not yet a general characteristic of our business people. In all centres for wholesale sale of piece goods, a broker goes to the wholesale dealer, shows a sample of cloth and offers to purchase a certain quantity. A regular haggling follows and unless the purchaser is cautious a slight alteration in the quality of goods delivered is not impossible. An artizan acquires some reputation for his wares. As orders begin to come in, he does not scruple to substitute inferior goods for those he generally makes. To ask for one price and take another is common in all ranks of trade, while to change artistic indigenous designs for hybrid foreign ones under pressure is not rare. All this will have to undergo a

radical alteration before it ceases to be an obstacle in the way of our economic progress.

The last great feature in our industrial and economic progress are local and provincial exhibitions. In Europe they have always been reckoned as great stimulants of trade and industry, in India they are also becoming the same. In European exhibitions there is, however, a little too much of artificiality which ought to be avoided in India. Our exhibitions to be useful should not aim too high. For instance, if they are to be local exhibitions for a district or province they should aim at showing the things made in that district or province more than those made throughout the whole of India as well as encourage and improve more the local or the provincial than the Indian trade or industry. In this way the accumulated result of many local and provincial exhibitions will be a great gain to the whole of the country. All India Exhibitions like the one now held with the Congress are also necessary, and I would encourage, to them as well as to all local and provincial exhibitions, visits of artizans and traders, free, as well as show them better methods of work. In the United Provinces the Nauchandi exhibition at Meerut and the local shows at Aligarh, Bulandshahar, Muzaffernuggar and other places, have proved useful in reviving many a useful local industry, and I would have such a show in each district every year under the management of its Local and Municipal Board.

These are some of the chief factors in our industrial and economic development, and each of them requires to be carefully strengthened before we can hope to secure it to the desired extent. As the world is now constituted, no country on earth can afford to be independent of every other country as in times past when facilities of communication were fewer, but no country in the world is so dependent upon every other country in the world as is India of to-day for every little need in the shape of manufactured articles. Such a prospect is not a hopeful one to contemplate, and it ought to be the care of every Indian patriot to see that much of this dependence is removed. We have now to face two problems:

the first, how to make ourselves as little dependent for articles of necessity upon imports from foreign countries as possible; and the second, how to find food for the forty odd millions now going through life upon insufficient food, upon the many more who are every year crowding upon an already impoverished soil and to secure useful and honourable employment for the yearly increasing number of young and intelligent men of education who having nothing better to do, have to swell either the ranks of an already overcrowded Government service with little prospects of promotion till the best years of life are over, or of the legal or the medical profession where the prizes are few and the blanks many. The only solution of the difficulty lies in making the country better industrially and agriculturally like Germany or America, and towards this the efforts of every one cannot be directed too soon.

ON SOME OF THE LEADING INDUSTRIES OF UPPER INDIA.

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The chief industries of Upper India and those most in need of development at present are cotton, silk, wool, sugar, leather and vegetable oils, and I shall, in this paper, briefly discuss the present condition of some of them and show how they can best be improved so as to conduce to the prosperity of our people.

Cotton has been a staple product of these parts from time immemorial, and in 1904, 14 million acres of land were under cotton cultivation, giving an outturn of 15,200 million pounds. In spite of the fact that cotton ginning, spinning and weaving mills are fast multiplying, all these occupations are largely pursued after the old methods all over these parts, and the demand for hand-made country cloth is not at all less than that for the machine-made article. The reason is that the old method is very cheap, affords employment to the women and the poor amongst the agricultural and labouring classes

and the yarn and cloth made by it are more durable even though they may be sometimes more costly than the machine-made article. The variety of cotton generally grown in these parts is the short-stapled known as the Bengals. Exotic varieties have been tried but without success. As I have already said in another place, I tried the American variety in my own village, in the Agra district, and took care to follow the directions both in sowing the seed and preparing the ground as well as in rearing the plants. But the outturn was not equal to the indigenous variety and the experiment had to be given up. Under better conditions, if very large quantities were raised, it may be more successful both in these and other provinces. The great recommendation of the Indian method is its cheapness all round. The cotton pod called *kapas* is picked early in the morning, when it is still damp from dew, by the women of the agriculturist's family. After a sufficient quantity has been collected, it is sold to a local trader at so much per maund. This year it is Rs. 7. The bania has the raw cotton ginned at his shop by a gin made of two rollers, one of iron and the other of wood, set up on a frame geared together by an endless screw and costing the modest sum of one Rupee and capable of ginning about 8 seers of cotton per day. He either employs a labourer or sets to work himself and pays the farmer from two to three annas a day. These labourers are generally village women. Ginning factories worked by steam power are also becoming common in almost all cotton producing centres like Agra, Delhi, Hathras, Muttra, Etawah, Kosi, Hapur, and have all proved paying concerns. They gin a maund of cotton for about half the price charged for hand labour and yet make 50 per cent. profits. The country gin has, however, not yet been driven out of the market, nor will it be so for many years to come. After being ginned, the cotton finds its way into the nearest market town or is resold in the village itself for being spun into yarn. The quantity disposed off in the latter is, however, very small, and by far the largest portion comes to the nearest town. Hathras, Agra, Etah, Cawpore, Delhi, Meerut, Aligarh, are all

large centres for the sale of cotton. Confining ourselves, however, for the present to the indigenous hand industry, we find that the ginned cotton is first roughly picked by the hand in order to remove the grosser impurities, then carded by a bow with a catgut string and afterwards made into sliver called *pooni*, and finally spun upon the spinning wheel. All this is done by the women of the family. If the latter do not card it, a professional carder does it for about an anna a seer. Spinning was once a very fashionable pastime for women even of the middle and the higher classes, and 25 or 30 years ago, parties of these ladies used to sit up spinning whole nights, each vying with the others in the fineness of her yarn and the quantity spun and one who wore clothes purchased from the bazar, was looked down upon by her companions. Nowadays the operation is confined to the women of the poorer classes. The quantity spun is about one-fourth of a seer in a day and the price paid is about two or three annas a seer of yarn. Large quantities of homespun yarn are still used in country handlooms because of the thread being stronger and tougher than machine-made thread. Ordinary qualities sell for about 12 annas or a Rupee, and finer ones for about Rs. 1-4-0 per seer. Formerly, when cotton was cheaper, it was three-fourths of these rates. The yarn is now made into skins by an instrument made of three pieces of wood in the shape of an H. or on a reel. It is then made into hanks and given to a weaver to weave. Numbers of these weavers, both male and female, even though their trade does not bring them more than a mere pittance, are still found in every village. Some work at their looms the whole day long, others only when they can spare time, from their fields. From a seer of yarn they turn out about 18 yards of cloth and charge from 3 to 6 pice per yard according to its fineness. A family consisting of a man, his wife and two girls, earns about 4 annas per day. The cloth made is coarse, but as it is more durable than machine-made cloth, it is greatly prized by the poor in all cases and by the higher classes where fineness of appearance is no consideration,

if larger quantities of *gasi* and *garha* were available, they would be used everywhere in preference to the grey shirting of the mills whether of India or elsewhere. Finer kinds are also woven by country weavers from machine-made yarn, which is generally imported. Formerly, when the spinning industry was more flourishing, fine yarn for hand-weaving was all spun in the country. Some places are still famous for their hand-made cloth. The checks of Ludhiana, Gujrat and Moradabad are largely prized by all classes of people. Women are still very fond of using stripes and checks made in these and other places because they wash better and are more durable than any machine-made article. A coarse kind of check called Dhobra, white and blue, used for floor cloths is largely made in and exported from Aligarh. The Chautais of Deoband and Sikandra Rao in the Aligarh District are also very popular. Etah, Saharanpur, Muzaffarnagar and Meerut also manufacture enormous quantities of coarse cloth of all descriptions. In the Azamgarh District, Mau and Mubarakpur are famous for their fine cotton and silk cloths. There are more than 12,000 looms in that district and of these 1,200 are at Mau and more than 1,500 at Mubarakpur. The weavers of these places are comparatively well-to-do people and export their wares largely to all parts of the country. The *gulbadans* of Azamgarh made from coloured silk are still very largely found in distant markets like those of Delhi. In times gone by, they were in great demand among the richer classes, both male and female. Now only women use them. The muslins woven in Jais in the Rai Bareli district, were so fine that they were sold for their weight in silver, at Rs. 5 per yard. The place has now greatly declined and out of 600 weaver families, only 200 are left in the place. The *chikans*, the *jamdani* and the *kamdani* work of Oudh (all fine muslins, woven or worked with silk or gold and silver thread) have earned a world-wide reputation. A piece of *chikan* of 10 yards sells from Rs. 10 and a piece of *jamdani* from Rs. 6. In the Punjab, Sialkot exports large quantities of hand-made cloth to not only the frontier districts but to the United Provinces and

Bengal also, and only 5 per cent. of the people there are said to use imported cloth. No figures of the quantity of cloth made in these indigenous handlooms, whether from hand-spun or machine-made yarn, are available, but that the industry, after agriculture, supports a very large number of persons is undoubtedly. In the United Provinces, out of 12 lacs supported by the cotton industry, only 20,000 are employed in mills and factories and the rest live by hand industries. In the Punjab it is even less, and out of a total of more than 4½ lacs of people only 58 per cent. are employed in factories. There is, therefore, a great future for the cotton hand industry, and if properly managed and the requisite funds are forthcoming, it promises to hold its own for many years to come against machine competition. The outturn may not be cheaper than that of a power loom, but it is stronger and tougher, and shall always, therefore, be preferred to the latter by the poorer classes of people. The experiment of employing handlooms of various patterns is also being tried in many parts of the country, but cannot yet be said to be a success. Two of these handlooms that have lately been set up in our Orphanage at Meerut, have not worked well, and the workers complain of the loss of material and the breaking of thread in working them. We have indented for others and hope still to be successful in this branch of hand-weaving. The reason why all these looms have failed, is, that they are not made with special reference to the Indian climate. In the meantime, if companies of small capitalists were organised in each town for having cloth woven by ordinary weavers after the old method, but under better supervision, it will find a good market, and with the increase of demand the supply will also increase. If such an industry is supervised by men who have received some technical training in an institute like the Victoria Jubilee Technical Institute of Bombay, it will be more successful than the work of many a hand-loom now in course of trial. In several Orphanages the boys make better *durries*, *dhoties* and country cloth than ordinary weavers because of better supervision. Coming now to imported yarn and cloth we find that in 1904-5, India

imported about 27 millions of pounds of yarn worth about 24 millions of rupees against 578 million pounds made by Indian mills. The imported yarn is almost all in the finer counts, 26 to 40's and upwards.

We have now many spinning mills not only in Bombay, Ahmedabad and Nagpur, but also in several places in Upper India. Agra, Cawnpore, Delhi and other places are now becoming large cotton centres, manufacturing cloth and yarn for not only the provincial but other markets also. From enquiries made from the managers of some of these concerns, I give below a rough idea of the extent of their operations, the markets they command and the number of hands employed :—

The Elgin Mills, Cawnpore : "Speaking generally, I may say, the Elgin Mills were the first cotton mills established in these provinces, and that they were commenced in 1864, and that they make all sorts of cotton yarn for hand and power-loom weaving, also weave all cotton goods, such as *dhoties*, *doosooties*, drill, themselves. We are situated on the banks of the Ganges and turn out about from 20,000 to 25,000 lbs. of weight of yarn and cloth per day and employ about 1,500 hands."

The Muir Mills, Cawnpore : "The goods manufactured by us can be divided into four classes: (1) spinning yarn, (2) manufacture of bazaar cloth, such as *dhoties*, *latthas*, etc. ; (3) manufacture of goods for European consumption, such as towels, drills, twills, counterpans and household and table linens ; (4) manufacture of tents and *durries* and dyeing of piece-goods and yarn. Our markets for these manufactures are as follows : (1) Yarns we sell in practically all the large towns and villages of the United Provinces, and as far East as Gaya, and Giridih in Bengal and Nepal in the North ; (2) bazar cloth is for the most part sold in Cawnpore bazar, but is also sold at our branches in the bazars of Jhansi, Delhi, Amritsar ; (3) cloth for European consumption is sold from our head office in Cawnpore and also at our branches in Calcutta and Lahore ; (4) *Durries*, tents, and

dyed goods are sold all over India, and we also ship them to Egypt, Africa, Straits Settlements and the Far East."

The Delhi Cloth and General Mills Co., is not so large a concern, and its manager tells me, that they make now only 500 lbs. a day and 1,400 when they are in full working order. Their cloth finds a ready market in Delhi even though they are short of weavers.

There are also other mills in Delhi, Beawar (Rajputana) and in the Punjab all turning out the coarser kinds of cloth for sale in the country. The figures of the last trade returns for India, however, show that in spite of the large extension of spinning and weaving mill-factories, the quantity of unbleached cloth imported was 1,210 millions, white bleached 584 millions and coloured, 493 million pounds, and that its total value was 355·59 millions of Rupees. This shows that even for the kinds of cloth which can be manufactured in the country, viz., the unbleached grey of the coarser qualities, we have still to depend largely upon foreign imports, and that there is a great room for expansion in mill as well as in the hand industry. In this direction no cotton mill under intelligent management, European or Indian, has ever failed. The Central India Spinning, Weaving and Cotton Manufacturing Co., managed by the late Mr. Tata, is a typical example of what one man can do. Starting with a capital of 15 lacs of Rupees in 1874, the Company has in a period of 30 years made a profit of about one crore, 98 lacs, employs 4,300 people, has 6 agencies for the purchase of cotton and 28 for the sale of cotton and yarn in different parts of India, makes about one crore and 60 lacs of lbs. of cloth and yarn during the year, works with the latest machinery and has a provident fund for its employees.

But it was all through the self-sacrifice of one man, who, as its report tells us, on the expiration of the term of his first agreement, finding his own allowance of Rs. 6,000 per annum to be too high, had it reduced to Rs. 2,000. There is no lack of managing capacity amongst the natives of India. Only, in order to make such large concerns a success, there must be a spirit of self-sacrifice. In 1904-05, as the Review of the

Trade of India shows, the production of Indian Mills, which consists chiefly of unbleached shirting, *dhoties*, table-cloths, domestics and *chadars*, increased 20·7 million pounds or 15 per cent. The yardage, which is stated for plain goods—that is bleached or unbleached, but not coloured or figured—increased by 87·2 million yards, the total of this class being 547·7 million yards and the weight thereof 130 million pounds. In the five months of this year from April to August the quantity of yarn spun was 28 crores 16 lacs of pounds against 22 crores 50 lacs for the corresponding period last year, each province showing an increase, and Bombay heading the list. In the Mills in the Native States it is also the same, and they show 7 lacs of pounds more of yarn spun.

In woven goods also instead of 5 crores 95 lacs pounds, we have 6 crores and 84 lacs. In Upper India, with which we are more immediately concerned, the quantity of yarn increased from one crore 15 lacs of pounds to one crore 43 lacs and woven goods from about 28 lacs pounds to about 30 lacs. In the manufacture of grey goods like *chadars*, *dhoties*, drills, jeans, Bombay shows a good increase. In Bombay town it was from 4 crores 10 lacs to 4 crores 62 lacs, and in the Bombay island from 2 crores 70 lacs to 3 crores 24 lacs. In Ahmedabad the increase was from one crore 5 lacs to one crore 6 lacs. In our own provinces it is from 24 lacs to 29 lacs, and in the Punjab from 42,000 to one lac lbs. The case with hosiery, figured and coloured, miscellaneous goods was also the same, and the increase of production in hosiery is most noticeable, for against only 6,000 dozens of last year, Bombay made 87 lacs of dozens of pairs this year. The Swadeshi movement has thus given a great impetus to the production of Indian Mills, and though India cannot yet clothe herself in her own *dhoties* and *chadars* and other grey cloth, and for many years to come will have to import these from other countries, the outlook for its mills in spite of the excise duty and the hours of labour and factory laws is far from being hopeless or discouraging. On the contrary, judging from the history of the spinning and weaving mills started in Delhi and elsewhere, with modest

capital and making only the very commonest kind of coarse cloth for the local market, it is very hopeful. There is now a growing disinclination to use finer kinds of cloth, whether Indian or foreign, and coarse *dhoties* and *chaddars* are coming to be largely patronized, especially in Bengal where fine clothes used to be the order of the day. Therefore, not only ought power mills to produce such cloth to be multiplied in all parts of the country, but a revival of the hand-loom industry both through improved looms as well as through better supervision of the work of ordinary weavers is necessary. Says the late Director-General of Statistics in his Review of the Trade of India for 1904-05:— "The decreasing importance of grey goods, both relatively and absolutely, is manifest from this statement (figures already given above), a fact which is explained by the great preponderance of these goods in the rapidly increasing production of the Indian Mills. It is also noticeable that while Bombay takes an equal or as last year a greater share of white and coloured goods, as compared with Bengal, it takes a comparatively small and diminishing share of grey goods of which Bengal, where there are no cotton mills, absorbs a very large share, 9,047,777,615 yards in 1904-05. The hand-weaving industry is also by no means a negligible quantity, for its production in cloth is double that of the Indian Mills, and it is still the largest industry next to agriculture, as the Census of 1901 showed 22-23 million hand-loom weavers besides dependants, numbering 24-25 millions. This ancient industry has suffered greatly from the production of machine-made goods and though still possessed of considerable vitality, seems to be steadily decaying" (p. 15). Therefore the sooner every rupee which the country sends out is applied towards the revival of its own hand-loom and the improvement of its own weaving industry, it will be a Rupee gained and will save its weavers, from having to fall back upon agriculture from destruction of trade, and the nation upon imported goods when the indigenous supply falls short. The Manchester merchants, whose business has been largely affected by the present revival of industrial activity in India, will not be slow to do all they can to restore it, and

they are already thinking of doing away with middlemen and dealing with the local trader direct. Unless, therefore, the Indians wish to be left behind in the race they should set to work and produce goods in quantity and qualities like those imported and sell them as cheap as they. For years to come the business may not yield large profits. But they must take to heart the example of the British manufacturer who has more concern with the sale of his manufactures than the profits he makes.

To sum up, unless the owner and the cultivator of the soil produce better cotton through improved methods of cultivation, the ordinary town or village weaver is utilized and employed by companies of educated Indians started in each town for the production of hand-made cloth in larger quantities, and weaving and spinning factories working both by power and hand-looms largely multiplied in each province, the great need of India to clothe herself with her own cloth will not be supplied even in any distant future. Between imported and handmade goods, the competition will never be on sentimental or caste grounds but on that of price and accessibility. These will always be the two chief elements in regulating the market and we in India cannot too vividly realize the fact. Handspinning and weaving are carried on in large portions of the country even for the pittance it affords to the spinner and the weaver. But each rise in the price of cotton and yarn drives a larger number of these workmen to agriculture and other trades, making us more dependent upon imported goods. But if the demand for the indigenous article rises steadily, they will have less inducement to leave their trades and be less miserable than at present. In this connection the question of dyed goods must also be considered. The figures quoted above show how enormous is the quantity of coloured cloths of all kinds that comes to India. Most of the dyes are of our own production. But the Indian dyer cannot dye cloth in such fast colours as the foreign dyer. The large quantities of foreign Turkey red (*kund*) and other coloured clothes seen in every town and village market, are a proof of the profits made by the

foreign manufacturer and on festive occasions every village damsel throws away her *sari* or *chaddar* of Indian *gazi* or *garha*, for one of foreign Turkey red. If, therefore, dyeing of fabrics were scientifically studied by educated Indians, both in as well as out of India, the profit will be great. The way in which silks are dyed in the Sassoon Mills of Bombay, shows what great development is possible in the dyeing industry. The materials generally employed are cheap indigo, turmeric, safflower, pomegranate, rind and others, that can be had everywhere, and half the cloth produced is dyed from them. Only the colours produced in the country ought to be as bright and neat as those of imported cloth, and they will at once attract custom. Those who go to Europe, America or Japan, cannot do better than take up this branch of the subject. All the yarn that is now dyed in the country for fast and bright colours is imported yarn. What is required is such a scientific development of the art of dyeing as would make the cloth and yarn dyed here compete with the imported article.

The Indian indigenous hand method as well as the machine method are not each without their weak points. For instance the power gin entangles the cotton fabric, makes it short and deprives it of its natural strength, which the hand gin does not. But the hand gin makes the cotton dirty and leaves the grosser impurities. In power machines between ginning and spinning there are many processes which except carding are not necessary in the hand method. In spinning mills the waste of material and the loss of strength of the cotton is much greater than in the hand method, being about 70 per cent. This is the reason why hand-made goods are stronger than machine-made ones. Again, with all the improvements in spinning the outturn of a mule is not more than 7 oz. per day, which an ordinary spinning wheel can also yield, but while the former can work 700 spindles the latter can only work one. The Indian spinning wheel can yet compete with the latest and finest spinning machine in the fineness of its yarn, but it cannot compete in the quantity produced. In weaving, the Indian weaver who has

to work with the worst yarn, still holds his own against the weaving machine. All spinning and weaving mills only sell their weaker yarn and use the stronger and the better qualities for their own cloth, and yet with the yarn he gets, the Indian weaver produces cloth stronger than machine-made cloth. In handlooms, with the exception of the Cannanore Weaving Factory no concern has yet flourished, and the Cannanore factory flourishes because it employs the best imported yarn. If a handloom which took into account the climate, the quality of yarn, the strength of the Indian labourer and the surroundings under which he has to work were made, it will be more successful than any yet employed. In dyeing, the reason why India cannot produce fast colours like those of Europe is that trade secrets which used to descend from father to son and master to apprentice, are disappearing with the decline of the trade. If chemical research were brought to bear upon the Indian method, the art can soon be revived.

The future of the cotton industry, which is the greatest industry of India, therefore depends upon what knowledge, enterprise and capital Indians are able to bring to bear upon it, and unless they are prepared to employ all these to the same extent as other countries do they can never hope to be independent of them.

Next to cotton is sugar. The average area under sugarcane cultivation in these Provinces is about 12 lacs of acres, and the average yield of *gur* (unrefined sugar) is 4½ crores of maunds per annum. The chief sugar-producing districts are Meerut, Muzaffarnagar, Shahjahanpur, Bareilly, Pilibhit, Moradabad, Ghazipur, Ballia, Azamgarh and Jaunpur. The largest quantity of sugar is produced in Meerut which has always been famous for its *gur*. But the highest outturn is in the Gorakhpur Division, where the natural moisture of the soil favours the luxuriant growth of the sugarcane. In Meerut, the system of cultivation is somewhat more improved than in the eastern districts, and though the outturn per acre there is about 36 maunds, against 38 of Gorakhpur, the quality is better. The quantity of unrefined sugar consumed

in the country is very large and only half of what is produced is refined. The consumption of the unrefined article is chiefly amongst the poorer classes and comes to about 20 seers per head of population. Refined sugar is used by the better classes and averages three seers per annum. The processes of pressing the juice and refining sugar are mostly those that have come down from time immemorial. The time-honoured *kolhu* (sugarcane-crushing mill) whether of wood or stone, is still common, and may be seen at work in nearly every village. In most parts of the western districts the two-roller iron mill or the three-roller *nahan* mill is now becoming common. These mills are set up in houses where a number of cultivators crush their sugarcane by turns on the co-operative principle. The cane for the *kolhu* is chopped into small bits for being dropped into the mill which is worked by a pair of bullocks moving round and round. The *kolhu* is a comparatively inexpensive article, and can be set up for a few rupees. It does not require much repair. The iron roller mills are very popular, and produce a large quantity of juice, but their expense stands in the way of their being largely utilized. The juice pressed out is collected into a large iron trough sunk underground below the mill. Thence it is removed to the boiling house, where it is boiled and purified by *sajji* (Soda) and other ingredients. It now thickens into a brown yellow mass, and when sufficiently thick, is transferred into an earthen receptacle, where after constant stirring it is made into *gur* and shaped into balls of different weights which are dried before being taken to the market to sell. The ordinary weight of a ball is from $2\frac{1}{2}$ to 5 seers. In the Meerut district, the *gur* of a place called Lawad is highly prized and is not inferior to refined sugar in taste. Large quantities of sugar-cane juice are also made into *rab* for the manufacture of refined sugar. The process of boiling is the same but the juice is not allowed to thicken like *gur*. This *rab* is manufactured under a peculiar system ~'led Bel in the Rohilkhand. The Bel consists of five pans and the juice is transferred from pan to pan in the process of boiling. In the last pan it is ready for the manufacture.

of refined sugar, and its colour is now changed from the natural to a golden yellow. The proprietors of these Bels are known as Khandsaris, and some of them, specially in Bareilly, Shahjahanpur and Pilibhit, are very rich. A concern like this can be started with the small capital of some Rs. 2,000, yielding a profit of 10 per cent. to the manufacturer. Money is advanced to cultivators on bonds to grow sugarcane and the boiled juice is brought to him for being made into sugar. If the manufacturer takes, say 1,000 maunds of juice in the season, its costs him Rs. 450. His staff of workers costs him about Rs. 75 and he earns about Rs. 50. Each 100 maunds of *rab* yield 60 maunds of sugar and his ordinary profits are Rs. 60 after two years on a capital of Rs. 500. But he is content with these small profits as they do not involve much risk. The trade was once a very flourishing one. Now it is declining under foreign competition, and I was told in Ballia that several refineries had to be closed on account of the enormous imports of bounty-fed sugar. This is proved from the fact that in 1902-03 about 5 crores, in 1903-04 about 6 crores, and in 1904-05 about 7 crores worth of sugar has been imported into the country. The highest imports of beet sugar were from Austria, Hungary and Germany, and cane-sugar from the Mauritius; so that 1 $\frac{3}{4}$ million cwts. of beet sugar and 4 $\frac{1}{4}$ million cwts. of cane-sugar were imported into India from foreign countries last year. During the quarter ending June 1905, the United Provinces alone imported 157,753 maunds of both refined and unrefined sugar. Java, Mauritius, Austria, Hungary are now deriving enormous profits from India because of the removal of countervailing duties lately imposed. India is said to be the largest sugar-producing country in the world and produces annually about 3 million tons, and yet it imported the enormous quantity of about 6 million cwts. Some of the leading manufacturers to whom I wrote to make enquiries as to the present condition of the sugar trade write as follows:—

Messrs. Carew & Co., Ltd., Rosa: "The value of the Sugar and Spirits sold by us for the year ending June 1905,

was 20 lacs. Markets for our goods are solely those in British India. As sugar makers and refiners we have suffered from the unrestricted import of beet sugars into this country, the result of which importation has been that not only have we suffered but also have the ryots who produce the raw sugar, suffered as they have been unable to obtain the higher prices which hitherto obtained, and in some parts a marked decrease has, we believe, arisen in the area of cane sown."

Sahu Brij Ratan, Moradabad: "The importation of foreign sugar has lowered the high prices of the native sugar, and about one-thirds of Khandsars only are now worked. In the Moradabad district about one lac of maunds of sugar is produced. A Khandsar costs about Rs. 3,000, and if it is properly worked and the outturn is good, it gives a profit of about Rs. 100. There are about 27 Khandsars in Moradabad and their approximate production is about 11,000 maunds."

R. B. Sahu Lalta Prasad, Pilibhit : "There is now a great decrease in the number of sugar refineries in Pilibhit on account of the loss suffered by the manufacturer. Formerly there were 150 Khandsars in Pilibhit, now there are only 92. The reasons are : (i) On account of the importation of foreign sugar which comes in large quantities and sells at cheaper rates, the rate of country sugar has fallen and confectioners cheat the public by mixing *gur* with imported sugar in order to make it look less white. On account of this mixture of *gur* which sells in Pilibhit at 10 seers a rupee, the price of imported sugar has fallen even lower. (ii) On account of a rise in the rates of sugar juice supplied by cultivators there is much loss in the trade. There is no limit to the quantity of sugar produced in a Khandsar. That depends upon the outturn of sugarcane in a village. Money is advanced to cultivators without interest between April and November of each year and varies with the quantity of the sugarcane grown. The refining of sugar is commenced in March and lasts till July, so that the capital of the refiner remains without interest for 8 months. At the end of the year large balances are left due from

cultivators, and if they are not cleared off in three years, the money is lost. The expense of manufacturing is about Rs. 3 per maund, and the profits and losses of one year are ascertained in the next. The average rate of juice is Rs. 34 to Rs. 35 per 100 maunds, which yields about $3\frac{1}{2}$ maunds of sugar. The average price of the latter is Rs. 12 per maund. If the treacle left is sold at a good rate, there is no loss to the refiner. In this year, on account of the high rates of imported sugar, the Khandsaris earn some profits, and in Pilibhit alone in the 92 Khandsars, 30,000 maunds of sugar was produced.

The industry has still a great future before it, and if a number of Indian capitalists engaged in the trade were to combine and work it under improved methods they might by producing an article as cheap and as refined as the imported one, yet drive the latter out of the market. Already there is a strong current of feeling in Indian society against the use of imported sugar, and dealers and confectioners have resolved to discard it altogether. But unless the indigenous article is not made equal to the imported one, both in appearance and in quantity, such a resolution is not likely to have any permanent effect. The Government should also so regulate their tariff as to prevent the indigenous industry from suffering under foreign competition. Free trade has been a source of great loss to India, especially in this respect.

The next important industry of these parts is leather. India exported in 1904-05 more than 8 millions of hides and 22 millions of raw skins worth more than 7 crores of Rupees. Her greatest customers are Germany, Italy, Hungary, Spain, France, the United Kingdom and America. On the other hand, she imported leather manufactures of the value of more than $\frac{1}{4}$ crore of Rupees, often of her own leather, in the shape of enormous profits to her customers. In the three months of this year, between April and June alone, Calcutta and Bombay imported from the United Provinces $3\frac{1}{2}$ lacs of maunds of skins and hides which are sent out abroad. This shows that if India could tan and manufacture her own leather there will be an enormous saving of money beside

profitable employment to a large number of her people. Shops for the manufacture of leather goods are found on a small scale in most towns of these parts, and Cawnpore, Delhi, Karnal, Ludhiana, Agra, are all great places for the leather trade, both manufactured and unmanufactured. But here there are no large concerns except those owned or managed by Europeans. In Cawnpore two of the most flourishing concerns are Cooper Allen's and the N.-W. Tannery, Limited. The latter was started some 18 years ago with a capital of 10 lacs of Rupees. It now employs between 1,000 and 1,500 men, tans and curries leather, and makes boots, shoes, harness, belts and other leather goods, after the latest and most approved methods. Its goods are largely patronized by the public and it turns out about 2,000 pairs of boots and shoes per day, with both steam and hand labour. Among native Indian factories may be mentioned the Shahganj boot and shoe factory owned by Sayad Musi Raza of Agra, who, starting with the modest sum of Rs. 80 in 1882, is now worth more than 1½ lacs. He turns out about 6,000 pairs of boots and shoes in a month. The average price of his wares is about 2 Rupees, and yet he makes a profit of about 15 per cent. He tells me he has now imported the latest machinery for the manufacture of boots and shoes and is soon going to work with steam power to meet his growing business, and to tan his own leather as well as make other goods generally sold by the trade. His wares are now finding favour with the best and highest Europeans, and he furnishes the example of what energy and pluck can do in a short time. The Hindus have generally a prejudice against engaging in the leather trade, though, as I have already said in another place, two Kashmiri Brahmans, men of education, overrode all caste prejudices and qualified themselves as experts in Cooper Allen's Factory in Cawnpore. Their first venture did not, however, prove a success. But they have not lost heart and are going to revive the business. There is a great field in this direction also, and if Hindus will not undertake business there is no reason why others who have no such prejudices should not do so.

The last great industry which though not quite indigenous to these provinces has yet a great future before it, is wool. In the Punjab it has been a great industry from time immemorial and Kashmir, Lahore, Amritsar and Ludhiana have always been great places for the manufacture of shawls and other woollen goods. But the industry is suffering under foreign competition, and Amritsar shawls which once sold for Rs. 50 each, are now not in such great demand as formerly. And yet an Amritsar Kashmir shawl is an article of great value, lasting and retaining its fineness of appearance much longer than any imported one. Large quantities of these shawls are still sold in Delhi and other places, and though much dearer in price than imported shawls, are popular with the Indian community. There are still thousands of Kashmir weavers in Amritsar whose business, though not so paying as before, gives employment to them even for the pittance it affords. In 1904-5, India imported the enormous quantity of of 306 6 lacs Rupees worth of woollen goods of which one-fifth were shawls. The number was about 25 lacs, of which Germany supplied 18 lacs. This shows how the trade has declined and what a great field it still has with better methods of work and more capital. The value of imported piece goods was 194 $\frac{1}{2}$ lacs and the quantity 23 $\frac{3}{4}$ million yards. In the United Provinces there are no large concerns except the Woollen Mills Company of Cawnpore, and in the Punjab the Egerton Woollen Mills Company of Dharial is by far the largest of any concern there. The former, as their manager tells me, now employ about 1,800 to 2,000 people in their works and have lately erected a large model village for them. They make every thing of wool and do not touch mixtures of any sort. They consume wool to the approximate quantity of 40,000 maunds in the year and confine their operations to India. Their flannels, broadcloths, Kashmir blankets and hosiery are largely patronized by the public, and I have generally found them to be superior to similar imported articles in point of durability. One thing noticeable about their cloth is that it does not contract as do many imported ones in washing. Their business was started in 1876, and

the capital employed is 35 lacs of Rupees. Their workmen are generally Indians but the proprietors are Englishmen. The Egerton Woollen Mills of Dhariwal have also the same object in view. They make woollen goods of all sorts in enormous quantities. Their goods are also all of pure wool and they send them out to all parts of the country and employ about 1,000 people. The proprietors of both these mills are the same. In the hand industry the number of persons engaged is about 80,000, and it must be said with regret that the number of workers is decreasing on account of foreign and mill competition. And yet the country blanket is still popular with the poor for its cheapness and durability. There are besides these some carpet-making factories in Agra and Mirzapur. The former owned by a European firm is a flourishing concern, but the industry in Mirzapur is declining on account of the inferior quality of the goods manufactured. The Government Jails, especially in Agra, are also great places for the manufacture of carpets, and the latter's manufactures may be seen in many a palace in Europe. But the prisoners after they have been discharged, have no opportunity of utilizing their skill and either take to manufacturing inferior goods or to other trades. In Muzaffarnagar the blanket industry is reviving under the impetus afforded to it by the local exhibitions. The blankets made there are very substantial and compare favourably in quality and weight with imported articles of similar description. The yarn employed is both indigenous and foreign, the former for the coarser and the latter for the finer kinds. The yarn made from wool imported from other parts of India like the Punjab, Rajputana or Tibet, is much softer and superior to that made from local wool. This is due to want of attention in the breeding of sheep. Perhaps greater attention in this direction might result in some improvement.

These are some of our chief industries. There are minor ones like the metal work of Benares and Moradabad, the brocades of Benares, and the furniture of Bareilly. But they are not of such great importance as these, and

I am sure that if greater attention, both on the part of capitalists and men of education were directed towards each of these, we shall be saving millions of Rupees each year besides affording profitable employment to thousands, both educated and uneducated, who are now dying for want of it. Capital is always shy; and because many of our people aim a little too high, they fail. If they started with small beginnings they are sure to be more successful. The most noticeable feature of the many colossal businesses now owned by Europeans is their small beginning and the steady perseverance of those who started them. And if we wish to be successful, we shall have to do the same. In Delhi and other places bogus joint stock companies rise and disappear for want of honesty of purpose on the part of those who float them. Speculation and gambling are now a great feature in the commercial world everywhere in India, and opium, wheat, silver and Government paper ruin every day more than they enrich, thousands who engage in them. All this money should be saved and applied towards the improvement of industries in some of the branches suggested above, and there will then be no inducement to our people to get rich in one day and find themselves in the Insolvent Court the next.

A PLEA FOR A CHEMICAL LABORATORY.

BY PURAN SINGH, Esq. (*Analytical Chemist, Tokio, Member of the Chemical and Pharmaceutical Societies of Japan*),
Lahore.

I have been in close touch with the wonderful system of education in Japan, for a little more than three years. I consider myself fortunate in having had the famous Professor, Dr. Wilhelm Nag-Nagai, one of the foremost disciples of Dr. Hoffman of Germany, as my beloved teacher in the Science of Chemistry. He gave me a thorough insight into the subject and moulded out of me a new man, from whom he said that he expected a good deal in the field of original research

in Chemistry. He sent me out here in India to work for the spread of this science in this country. I am really proud that Dr. Nagai owns me and I am very well fathered as a Chemist to appear in any assembly, whether of Chemists or of those who take interest in the subject.

WHAT JAPAN HAS DONE.

Gentlemen, Science occupies the most prominent place in the curriculum of Japanese education and the aim is, to produce first class Botanists, Geologists, Chemists, Metallurgists, Bacteriologists, Agricultural Scientists and Engineers. The system of education is so wisely organised that at the bottom, it spreads the knowledge of letters to the masses broadcast, so that 94% (both men and women) of the total population are literate, and at the top, it merges into the sublime heights of the Spirituality of Science, so that, Japan, to-day, is not behind any country in the field of original research in any science. But the whole strength of the system lies in the production of the captains of industry. The Universities organise the raw Japanese intellect into a tremendous force, with which the resources of the country, both of land and sea, are governed, investigated, developed and made into the national treasures. Every nook and corner of Japan has been and is being searched by them and the day is not far, when every little particle of sand will be literally made to contribute to the national wealth.

THE GEOLOGICAL SURVEY OF INDIA.

Sir, the land resources of every country are more or less enormous, but nowhere is there such a great variety and abundance as in our land. The Science that will lead us to take the first step in the organisation and development of our industrial resources, is Geology. By making a fundamental and thorough Geological Survey, it will find out for us and locate our mineral resources. The best surface materials for glass, cement, pottery, etc., will be made known. For example, samples of the best kind of quartz were sent to me from Kangra district and the rates given were incredibly low, because of its abundance.

The hills of quartz, the best material for high class optical glass, are to be found somewhere near Gwalior State. All these surface raw materials with their definite localities should come within the knowledge of every intelligent Indian.

Geology will do more. It will dive deeper and reveal to you the rich, hidden contents of the underlayers of earth and will open mines of information on the Mining industry including metallurgy. America, England, Germany and Japan draw a great part of their income from the mines. The Boers only had a few. Thus, it is that the science of Geology would solve many of our preliminary problems. Some Geological surveys have been made here by the Government officials, but they are quite inadequate to our needs and do not aim to be exhaustive. We shall have to make for ourselves an exhaustive Geological Survey, as a right beginning to our material advancement.

BOTANY.

The Science of Botany, too, does the work of surveying the vegetable and herbal treasures, locating them and showing the possibilities of their growth. Till some more time to come, I mean the point of greater development of Synthetical Chemistry, the world will be in need of its raw materials, mainly from the vegetable kingdom. For quinine, cinchona and for India Rubber, the ficus tree, and for camphor and other perfumes, the various aromatic trees and herbs, and for alkaloids, belladonna, poppy, oconitum, ipecacuanha, etc., will be always sought. Synthetical Chemistry has done wonders. It has synthesised indigo, camphor, Otto-de-Rose, etc. But still, it is regarded to be yet in its infancy, and if proper researches are made and continued, there is a possibility of competing in indigo and camphor also from natural sources. Dr. Nagai invented a method of extracting indigo from Indigofera Polygonus which is the indigo-yielding plant in Japan, and his indigo got the gold medal in the Paris Exhibition and is much better as a dye than the artificial indigo. This was frankly admitted by the German merchants. The indigo industry in India

is in the hands of non-scientific Anglo-Indians and no researches have been made to improve the quality of the dye. Thus, Botany not merely as a pure Science, but as a science applied to Medicine and Agriculture, will have to be taken up in all earnestness.

CHEMISTRY.

Though the ancient alchemists did not leave to us the mysterious Philosopher's Stone reputed to turn iron into gold, yet they have certainly bequeathed to us in that riddle, germs of a profound Science of Chemistry, touched with which a poor nation grows rich and a rich nation grows richer. In converting the raw materials of little or no value, into valuable commodities of daily human consumption, Chemistry exercises a vital influence on human life and is a great factor in national advancement. Germany has stolen a march over England on account of the development of the Chemical Sciences, for the real study of which men like Dr. Perkin are, perhaps, crying in the wilderness in England.

There is no manufacturing industry that does not require the aid of Chemistry. The Science of Engineering, apart from its application in navigation and road metalling and bridge making, is solely for a secondary service to the manufacturing Chemist, viz., to supply mechanics and look after its working, while the privilege of the Chemist is to create things. Technical Education or Industrial Education that does not include a thorough and masterly study of Science in general, and Chemistry in particular is futile and does not fulfil its purpose.

The very first thing that they in Japan did to organise their educational system was to send some brilliant youths to foreign countries, who, in some cases, stayed for more than sixteen years abroad to thoroughly master their respective subjects, and when they returned home, they were recognised professors and experienced experts in industries. This step is fortunately followed by our people, too, but I have to point out that the wise move of sending students to foreign countries is only the second step taken first. Such

was the case in Japan, because they brought out professors and experts from the foreign countries and started that work in anticipation of whose demands they had sent their young men abroad. They began the industrial work also similarly without their own men.

I have personally met old Japanese engaged in industries, to know something of the history of the introduction of foreign industries in Japan. It has been the history of losses, disasters, and bankruptcies. But you know how the Jananese fight, and they fought in this field as bravely as they did on the battle fields in Manchuria, and though many fell and many fainted, they control these foreign industries as they do their own beautiful indigenous arts.

In short, a thorough, scientific educational system supplemented by industrial organisations started at any cost under our own experts or foreign experts, will produce these very fruits here which Japan is enjoying in these days. In order to properly respond to the great cry of Industrial Regeneration of India that is being raised in the country from end to end, you will have to successfully build up a grand Temple of Scientific Knowledge in India which would aim to produce real hard-working Edisons and Hoffmans. The happy thoughts of a moment of Scientists may open a century of industry. One chemical reaction can set up into being a whole factory handling millions of rupees. Like the perennial snowy summits of the Himalayas our towering and Science-absorbed savants will certainly feed the running rivers of our national industries, which cannot possibly prosper without their kind and royal side-glances.

After my return home, I have been just finding a place to stand upon and the V. D. J. II. Technical Institute, Lahore, which I have the honour to represent in this assembly, opened an Applied Chemistry Department. We had two students who after one year had to give up their studies abruptly, and we had to cancel a large order sent to Germany for apparatus to equip our laboratory more extensively. In fact, we had made a fair progress, when for want of students, the whole thing came to a standstill.

In this Laboratory, I have been experimenting for the last two years on the possibility of various chemical industries that it would be profitable to start in this country. I give below a report of my experiments :—

REPORT OF MY EXPERIMENTS.

Each and every one of the following industries can be started at once and the chemical as well as the commercial purity of the articles thus manufactured guaranteed.

TURPENTINE.

Official reports show that vast quantities of Turpentine Oil are imported every year. We also import Rosin and bye-products of Turpentine factories. In India, there is a vast field for this industry. Nepal has forests of pine trees. Kangra, Chamba, Jammu, Hazara and Dehra Dun, Tehri and other forests can, in my opinion, afford sufficient materials for at least ten Turpentine factories, each handling one ton of raw material every day. Raw Turpentine is obtained from the following species, by making seasonal incisions, which do no injury to the growth or the timber of the trees :—Pinus Pinaster S. Maritima, Pinus Silvestris, Pinus Palustris, Pinus Australis, Pinus Tarda, and Pinus Strobus. From the middle of February to the beginning of November incisions can be made.

The yield of Turpentine Oil ranges between 20 to 25 per cent. and that of Rosin from 60 to 70 per cent. Both these articles are of extensive application in every country.

The following is an almost exact estimate of a Turpentine factory that may work one ton of raw material every day.

CAPITAL NEEDED Rs. 50,000

	Rs.
Machinery and Building (Machinery includes Boiler, Engine, Stills, Sundry Appliances, &c.)	10,000
Running Capital	35,000
Reserve Fund	5,000
Total	<u>50,000</u>

MONTHLY BALANCE-SHEET.

Expenditure.	Quantity in maunds.	Price. Rs.
Raw material required per month (Rs. 5 per maund, including the State or Government Royalty amounting to 0.80 per maund and other gathering expenses) ...	840	... 4,200
Establishment expenses 200
Manager's pay 500
Fuel and other expenses 200
Wear and tear of machinery taking its life to be ten years 84
Total expenses	...	5,184

<i>Income.</i>		<i>Quantity in maunds.</i>		<i>Price. Rs.</i>
Oil, at 20 per cent.	...	168	...	4,200
(Selling at Rs. 25 a maund wholesale, deducting all commissions, etc.)				
Rosin at 65 per cent.	...	546	...	2,184
(Selling at Rs. 4 per maund deducting all commissions, etc.)				
	Total	...	...	6,384
Interest on Rs. 5,184 at the rate of 5 per cent., per annum	...	...	about	260
Interest per month	...	...	...	22
Net profit therefore per month Deduct (5,184+22)	...	...	...	6,384
	...	...	...	5,206
				1,178

This factory can be started even on a smaller scale. The raw material—the *ganda biroja*—can be had in sufficient quantity for such a factory from Amritsar, Jammu and other places, which is selling at equal rates with Rosin, the bye-product of the Turpentine factory. Individual effort may succeed in reaping enough profits for its own labour, but, in consideration of the great open competition with foreign countries we have to organise on a large scale.

The Punjab Government has been trying the experiment for turpentine manufacture for some time, and the reports of the Forest Department show that they were very profitable concerns but last year the Nurpur Turpentine Factory was closed with the remark that it was more paying to sell the raw material than the finished articles. I find that the Nurpur Factory was worked with crude methods. Steam distillation has not yet been tried by the Government. The old kettle process is in favour. The Government reports betray some misgiving as to the life of the pine trees from which it is extracted, but this is a wrong notion, if the tapping process is carried on judiciously. The other factory of the Government is attached to the Dehra Dun Forest School and it is working well. The pine forests of Native States like Jammu and Patiala and

other hill forests, if taken lease of, can supply the raw material for more than two factories. I strongly urge the importance of this industry on my countrymen.

SHELLAC.

This is the second industry that has come under our notice which can be a better source of income than now. India is one of the shellac-supplying countries. Shellac is sold in great quantities in England and Germany. We have visited various shellac works in India and have seen that they are working in very crude ways. There is a large factory at Amritsar, but its methods are also very crude. Mirzapore has some European factories which use machinery and have a fame in foreign markets for the purity of their article. The writer has discovered a method, by which we can refine and manufacture shellac in a very economical way and can turn all sorts of inferior shellacs into the pure superior shellac of golden lustre. Shellac can be had in plenty from Assam and can be gathered in thousands of maunds from the Hoshiarpore sides in the Punjab, and also from the jungles of the Central Provinces. Perhaps Khandesh also is a market for raw lac.

Here is an estimate for a Shellac factory:—

	Rs.
Capital required...	... 50,000
Machinery, &c. ...	... 5,000
Revenue Fund ...	... 5,000
Running capital...	... 40,000

The profits of this factory will depend upon the quantities purchased at the proper seasons. So a good deal of money is to be invested in the purchase of the materials.

The figures are for 500 maunds per month:—

The price of the raw material ranges from Rs. 25 to Rs. 30 per maund. The yield of Seedlac is from Rs. 70 to Rs. 80 per cent.

	Maunds.	Rs.
Raw material per month ...	... 500	15,000
Expenses on fuel, &c. ...	... 200	
Establishment expenses ...	... 200	
Wear and tear of machinery taking its life to be 5 years ...	... 84	
Interest per month, at 5 per cent. per annum for about Rs. 16,000 ...	... 70	
		<u>Total</u> ... 15,554

The yield counting at the minimum average of

70% 350 ... 21,000

The cheapest rate when the market is very low
is Rs. 60 per maund.

By our special process, the chemically pure Shellac can be made and the yield is almost the same as that of Seedlac, say 60 to 65 per cent.

This Shellac, of course, sells higher than the Seedlac, which contains rubbish also. The cheapest rate for pure Shellac is Rs. 80 per maund. Counting at this rate, the sale-price of 300 maunds of pure Shellac is Rs. 24,000. Gross profits including the shipping charges to England or Germany as well

as commission is in round numbers 5,400 for Seidlac, and 8,400 for Shellac. This industry too can be made paying in the local market by investing a small capital. The special method aforesaid will highly advance the value of Shellac in foreign markets. Raw lac being very different in its composition, the Amritsar people can get 20 to 25 seers per maund. The above estimates are for the best of raw materials.

I have examined the Hoshiarpore raw lac of the Punjab, and find that it is not so good. Communications from Burma have come to me that in Burma, it is available at 3 to 5 seers per rupee. I think, if a joint stock company is reorganised to work up this raw material in Burma, good profits will ensue.

GRASS OILS.

Rhusa, Khus, Khavi, Nimbughas and various other species of fragrant grass grow wild in the Punjab, showing the possibility of their cultivation. In many tracts, the farmers uproot these valuable materials of great economic value. Here I may point out that in Singapore there are some hundreds of acres grown with Citronella and Lemon grass by the famous Fisher Co. In the Punjab these grasses should be cultivated anew, and the supply that is available now we should commence to utilise.

We find that Patchouly can also be cultivated in the Punjab. Its seeds or plants are available at Singapore.

The following is a general estimate for a factory :—

	Rs.
Plant	...
Buildings	...
Appliances	...
Running Capital...	...
	<hr/>
Total Capital	... 50,000
	<hr/>

CITRONELLA.

Raw materials for one month = 840 maunds.

	Rs.
Costs at 12 annas per maund on the still	... ... 630
Fuel and other expenses	... ... ... ... 150
Establishment	... ... ... ... 500
Interest	... ... ... ... 210
Wear and tear	... ... ... ... 80
	<hr/>
Permanent expenses	... 940
	<hr/>

One still with Citronella gives out 1,260 lbs. of Citronella oil. The other still with Lemon grass gives out 1,260 lbs. of Lemon grass oil.

Citronella costs	...	...	...	...	...	...	630
Lemon grass, 840 maunds, at Re. 1 per maund	...	...	...	...	...	...	840
Common expenses...	...	...	...	...	...	...	940
							<hr/>
Total cost	...	...	...	...	...	...	2,410

INCOME.

				Rs.
Citronella, at Re. 1 a lb.	...	...	...	1,260
Lemon grass, at Rs. 2 a lb.	...	...	...	2,520
				<hr/>
		Total sale	...	3,780
		Deduct expenses	...	2,410
				<hr/>
		Net profit per month	...	1,370

ANISE OIL AND THYMOl.

These are others that I have experimented upon. The following are the figures :—

Anise for one still per month	...	...	...	840 maunds.
				Rs.
Costs at Rs. 5 a maund on the still	...	...	...	4,200
Ajowayan for the other still 840 maunds, costing Rs. 4 per maund	...	...	...	3,360
Common expenses	...	...	...	940
				<hr/>
		Total costs	...	8,500
				<hr/>
Yield of oils	...	1,260 lbs. Anise. 900 lbs. Thymol Crysta. 1,700 lbs. Ajowayan oil.		
				<hr/>
Total	...	3,260 lbs.		
				Rs.
Anise, at Rs. 5 a lb.	...	...	...	6,300
Thymol, at Rs. 8 a lb.	...	...	...	2,400
Ajowayan oil, at Rs. 2 a lb....	...	...	...	3,100
				<hr/>
		Total sales	...	12,100
		Deduct expenses	...	8,500
				<hr/>
		Net profit per month	...	3,600

As for the consumption, an organisation is needed to distribute the products in India. Some of the oils can be exported.

LEMON OIL.

This oil is usually and commercially extracted from the rind of the citrus species and not particularly the Lemon peel. One from the Lemon peel is very dear. For this oil, there are plantations of Lemon in Italy. There is a great field for such a plantation in India.

Lemon juice serving as a raw material for citric acid and the Lemon peel for oil, the plantation of Lemon would be a great industry in itself. Our people should stir themselves and see if there are tracts of land available for such an experiment.

No definite estimate can be given for evident reasons. But considering the consumption of this oil and its general demand in all countries, the industry promises to be paying like all other essential oils.

CAMPHOR.

India is a camphor-buying country. It is obtained from camphor trees. It grows abundantly in Formosa, China, and Japan. There are some suitable climatic conditions for the plantation of camphor trees in India. But the competition which Japan is opening with the whole world in this industry, renders the chances of this industry being profitable in India very remote.

Carraway and Eucalyptus bid fair to succeed. A large limited Company with an exploiting capital will open quite a future for India in essential oils. While prospecting this Company can use its capital in producing the best of Indian perfumes on a large scale and by Western scientific methods—meeting all tastes. There is a great margin of profit in Attars of Rose, Bedmushk, Kewra, etc. The different seasons would keep the factory engaged with different materials in rotation.

CHEMICALS.

Recently, I received Chrome Stone from Quetta, and Cobalt ore from the Upper India Glass Works and the Manganese ore from the Central Provinces. I successfully made Cobalt oxide, and Chrome oxide which are the most important pigments for blue and green glass and supplied 20lbs. of the latter to the Upper India Glass Works, Umballa. By coming to terms with the glass factories, I hope a very successful business can be done in these oxides. My students prepared the Iron oxide from ferrous sulphate, which can be easily prepared from the Iron pyrites. I have just received a letter from Maiwara, from the Manager of the New Mining Association, that they have discovered a large deposit of Iron pyrites.

There is a great possibility of manufacturing sulphuric acid from these pyrites, but the Lahore Laboratory having been temporarily closed, I cannot proceed with my experiments. I was engaged in preparing Potassium Bichromate from the Chrome Stone of Quetta but could not finish it to put its assay before you.

As for the manganese ore, we prepared Potassium permanganate which is largely used as a Chemical under the name of Condy's fluid.

Zinc oxide and the red lead and other pigments of which an enormous quantity is imported from foreign countries can be turned out here, and a few samples of them are sent by the Lahore Institute to the Benares Industrial Exhibition.

Gentlemen, Thus I have been engaged in experiments, and those of them that promise some commercial profit, I have put down in the above report. I have been trying many other experiments which I cannot give here. While experimenting on Chrome tanning, I found out a treatment for curing those skins which get stained or spoiled by bad fat liquouring. In one experiment, I got the fibrous mineral variety of CaS_4 which is very interesting.

A PLEA FOR A CHEMICAL LABORATORY.

In conclusion, I beg to propose to this assembly, as I have done in the Punjab almost in vain, to start at once a Chemical Laboratory costing not more than Rs. 10,000 to start

with, with the express purpose and direct aim of investigating, analysing and definitely determining the economic value of various raw materials of India which are available under the present circumstances, described in Watt's *Dictionary of Economic Products of India* and the *Economic Geology of India*. This Laboratory can be worked on commercial lines. One of the Chemical industries that I have reviewed above, may be taken up and a model Chemical Factory started in connection with the Laboratory. When one such model factory is run for a sufficient period, it may be sold to a public company and another Chemical industry taken up. Thus, this laboratory can be made the centre of information and a means of establishing various Chemical factories in the country and shall contribute to the success of the Swadeshi movement and the solution of the industrial problem in India.

Extracts from the Report of the Victoria Diamond Jubilee Hindu Technical Institute, Lahore, for the year 1904-05.

II.—INDUSTRIAL CHEMISTRY CLASS.

Mention was made in the last year's report of advantage having been taken of Mr. Puran Singh (who had returned from Japan after completing a three years' course of study in Pharmacy there) by holding classes commencing from 1st April 1904, for instruction in Industrial Chemistry. Up to October, 1904, only one lecture a week was given, and during this period on an average seven young men attended the lecture days. This was, however, considered an unsatisfactory arrangement, and in order that the work in this direction should result in practical good, regular daily classes were introduced from November 1904, in which two students joined in that month and two in March 1905. The syllabus (Appendix A) suggested for this class is rather a comprehensive one, but it is not proposed to fully work up to it until more experience is gained. The Rev. D. J. Fleming, Professor of Science, Foreman Christian College, Lahore, was kind enough to inspect our work, and he has remarked as follows :—

"On the 14th of April, I had the pleasure of inspecting the work in the Chemistry Laboratory of the Technical Institute.

"The three years' course, as outlined, ought to well prepare a student to engage in the manufacture of those chemicals, which can be made commercially profitable in India, and to undertake the posts of Chemical Assistants in connection with various manufactories throughout India.

One year of the three years' course has been taught, so far. On examining the student who has taken the work thus far, he appeared to have a ready, accurate, and practical knowledge of the work. It was plain that his interest was practical and not simply theoretical, thus fulfilling the end of the Institute.

"Mr. Puran Singh, the well-qualified instructor in this department, is making good use of the limited laboratory facilities, and considering the inadequate equipment, the results are to be commended."

SYLLABUS OF THE INDUSTRIAL CHEMISTRY CLASS.

I. The course of the Industrial Chemistry class will extend to three years with a supplementary period of six months.

II. Every year is divided into three terms :—

1st term, 1st April to 31st August.

and " 1st October to 25th December.

3rd " 1st January to 31st March.

	1st year.	1st term.	and term.	3rd term.
Analytical Chemistry 28 hours.	30	30
Inorganic Chemistry (lectures)	...	10	10	15
Steam Engine (lectures)	...	4	4	...
Mechanics	...	2	2	...
Drawing	...	4	2	3
2nd year.				
Analytical Chemistry 20 hours.	24	30
Inorganic Chemistry	...	6	4	...
Indian Economic Geology	...	3	1	...
Mechanics	...	2	2	...
Organic Chemistry	...	10	10	12
Drawing	...	3	3	...
General Botany	...	4	4	6
3rd year.				
The special subject practical	...	30	30	30
Lectures on Mechanical Engineering	...	4	4	4
Inorganic Chemistry	...	2	2	2
Organic Chemistry	...	6	6	6
Factory Design	...	3	3	3
General Botany	...	3	3	3
Final Examination, 12 hours.				

CHEMISTRY AS AN INDUSTRIAL SCIENCE.

By GOPAL CHANDRA BANERJI, Esq., *Kaiser Soap Works,*
Cawnpore.

Chemistry is that branch of natural philosophy which deals with the study of the nature and properties of materials which enter into the composition of the earth, the air and the sea, of the various organised and living beings which inhabit them. Its aim is to investigate and imitate the processes by which nature manufactures her varied gifts to this world of ours and to utilise those gifts fully for the peace and prosperity of mankind. In ancient times it seems to have been applied to various methods of melting and preparing metals and was identified with the visionary efforts of alchemy which professed to be the art of transmuting copper and other baser metals into nobler ones. They failed in their attempts but the modern chemists have succeeded, though in a different shape. That which was considered waste and refuse is now converted into mines of gold. It is only in the last 70 or 80 years that chemistry has risen to the rank of a science, but during that period it has advanced towards perfection with a rapidity unparalleled in the history of natural philosophy. It is universally applicable. There is no science so immediately conducive to human comfort. To whatever art or manufacture we turn our attention we find that it has either been created by chemistry or owes to it some of its greatest improvements.

Perhaps I may be allowed to mention here some of the wonderful results which the modern chemists have achieved. Every one knows what Coaltar is. It is a heavy liquid with a dirty black colour, but from it are produced the brightest hues in all the shades of a rainbow. Germany is the home of the so-called annaline colour industry which has driven from the field, the beautiful Indian colours for which India was famous throughout the ages. This development of the artificial colour industry of Germany has dealt a death-blow to one of the most important and lucrative industries of our country, Indigo. Indigotine, the artificial indigo, is now

before the world and has outlived the prejudice of the English textile manufactures. Mr. William Popplewell Bloxam, in his report before the Chemical Society has declared that it is very difficult to distinguish the artificial indigotine from the best natural indigo of Tirhoot even by superficial analysis. Again, Coaltar has a very bad acrid taste but its product saccharine is 550 times sweeter than sugar and is used in enormous quantities in India. Chemistry has contributed largely towards the process of extracting sugar from several articles, beet and other roots, which enables the imported sugar being sold cheaper than indigenous sugar even in Benares, a district known to be the home of the sugar industry. The third product of Coaltar is still more wonderful. Every one is aware of its tarry smell, but from this Dr. Teimann, the great German chemist produced "Tonone," the delicate perfume of fresh violet. Perfumes of Rose, Jasmine, Heliotrope and Hyasinth are now being manufactured by the chemists in closed rooms without the aid of the natural flowers, which may be blasted at any time by drought or excess of rain. Such is the wonder wrought by the science of chemistry, and yet it is only an instance out of thousands.

Let us see if the science of chemistry can be of help in the industrial progress of a nation. I may again be allowed to call your attention to the progress made by Germany during the last 30 years. The national wealth of Germany has increased largely by her chemical industries. German sugar, Chemicals, Perfumery, Soap and Colors, can be had even in the sequestered and distant villages of India, and such is the case with almost all the other parts of the civilized world. Even conservative England cannot do without them. Allow me to put before you a few figures taken from the *German Chemical Trade Journal*. The number of works in 1904 was 8,004, the number of qualified workmen 177,461, wages paid 185,050,509 marks, i.e., about Rs. 14 crores. The exports of German Chemicals in 1904 were worth 473,499,000 marks or Rs. 34½ crores. The total value of Soap and Perfumery exported from Germany in 1904 amounted to 12,625,000 marks, or Rs. 9,44,74,000.

Now, what can India shew in this branch of industry ? Nothing practically. On the other hand, I am sorry to say that the total imports into India from all sources during 1903-04 of chemical products amounted to Rs. 6,83,12,118, including Sugar chemicals Rs. 59,01,858, Soaps Rs. 26,56,673, and Perfumery, Rs. 3,11,651. The total imports of sugar into India during 1903-04 amounted to Rs. 5,94,41,936. The above facts and figures must appeal to you. There is no lack of natural resources in our country. The raw materials which have contributed so much to the vast wealth of England, France and Germany, are at our doors. We have got almost everything necessary for the different branches of chemical industries. The question arises, from where can we get men to carry out these industries ? Can they be had in India ? It is with deep regret I say, No. Chemistry, as taught in our Colleges, is of very little practical value, as they impart only a theoretical knowledge with the least practical results, I do not mean to say that the science of Chemistry can only be taught by the handling of the test tube and retorts ; a practical chemist must be a thorough master of the theories and chemical laws. No science can be of any practical use without the knowledge of the theory on which it is based. There cannot be an independent division of science into the practical and the theoretical. These two must go hand in hand. I cannot quote a better authority than Professor Huxley on this point. This is what Professor Huxley said with reference to the misleading term, "Applied Science" :— "I often wish it had never been invented, for it suggests that there is a sort of scientific knowledge of direct practical use which can be studied apart from another sort of scientific knowledge, which is of no practical utility and which is termed pure science. But there is no more complete fallacy than this. What people call 'applied science' is nothing but the application of pure science to particular classes of problems. It consists of deductions from those general principles established by reasoning and observation which constitute pure science. No one can safely make these deductions until he

has a firm grasp of the principles ; and he can obtain that grasp only by personal experience of the process of observation and of reasoning on which they are founded." The difficulty is that in our Indian Colleges and Schools the teaching of chemistry ends practically with the teaching of some of the elementary theories. An M. A. in Chemistry or a B.Sc. has to study hard the laws of combination rather than devote his time to the handling of the balance. In my humble opinion a knowledge of Chemistry should be imparted to a young student by demonstrating the effect first and then the cause, and not by proceeding from cause to effect. It is not even the analysis and synthesis that could make the good chemist ; unless he takes up some research work he cannot become perfect in the science and in the art of handling the delicate apparatus, nor can he be useful to his country. There lies the difference in the teaching of Chemistry in England and in Germany. In Germany every student after passing his competency examination, not in the University examination hall, but from the laboratory of any well-known professor, is given at once some research work and this accounts for the progress of chemical industry in Germany. England may well be proud to be the inventor of Coal-tar colours, but Germany has the whole world's market in her hand, giving employment to hundreds of young chemists. One firm employ over one hundred chemists whose zeal, labour and brains are bringing into their mother-country heaps of gold. The Allahabad University has, no doubt, taken a step in the right direction by throwing open two Fellowships to the distinguished science students, but they have not the same advantages as the research scholars of the European Universities. Even the well-fitted laboratory of the Presidency College at Calcutta is not complete and can be compared with the private laboratories of Europe. It is not even big enough to enable a large number of students to carry on practical work. I beg to quote a few lines in support of my statement from our most esteemed scientist, Dr. Jagdish Chandra Bose : "While visiting different laboratories here (in Europe) I must confess to an unworthy

feeling of envy which took away all my pleasure. How splendidly equipped and organised they were, what facilities existed there for every kind of investigation!" Dr. P. C. Roy, Professor of Chemistry, recommends that students, after studying up to the B. A. standard, should go to England or Germany. Who is responsible for these shortcomings? It is a question that has been discussed over and over again. In every country the Government is responsible for the proper education of the people. Our Government has done much, but has it done all that it should have done? There is only one possible answer. In every civilized country, Government always takes the lead in the matter of education and then follow private enterprise and private endowments.

But the case here is a deplorable one. A country so much behind Europe, behind even Japan, in education, cannot easily expect private aid in the cause of science. If by some good fortune somebody comes forward with a munificent donation, he, instead of being encouraged, is obstructed by the Government. With due respect I mention here the cherished name of Mr. Tata and his princely endowment for a college of higher scientific training and a research laboratory. Where is that college for which we are looking forward with so much eagerness? It is not yet started and the kind Government of Lord Curzon never thought it fit to start. I want to see this noble institution rising from its firm foundations. A question is generally asked whether the mode of living and surroundings of the Indian students are suitable to carry out intricate practical work pertaining to the scientific researches. Those who put forward this question have never taken the trouble to investigate the case thoroughly. They see the number of sound lawyers, judges, philosophers, statesmen and literary men equal in quality and number to any that any nation can boast of, but very few scientists. But just consider for a moment the deep and minute calculations of our old Aryan astrologers. Dr. Roy has thrown some light on ancient Hindu Chemistry. Besides, the study of the Ayurvedic system of

medicine will conclusively prove that our forefathers were not wanting in the capacity to make original researches without the aid of the microscope and the most delicate chemical balances. Their marvellous discoveries are the wonder of the Western world. The point is, have we inherited those qualities and do we still retain the same capabilities in this age of progress ? I am glad to say, Yes. Have we not amongst us the best surgeons and the best engineers, and are not the qualities which make the best surgeons and engineers the same which go to make the best scientists ? Professor Jagdis Chunder Bose has borne testimony to this by his original researches in electric currents, with the aid of the most crude instruments manufactured locally at Calcutta. The original contributions of Dr. P. C. Roy, Dr. Chunni Lal Bose and others on the science of chemistry may be read in the Transactions of the Chemical Society. Even a rare metal has been discovered in the Bombay Presidency by a very young promising Geologist, Mr. Baidya Nath Shaw, M. A., now working under a mining syndicate. The practical work of Professor Gajjar of Bombay in the processes of dyeing is well known. We do not lack in brain power, neither are we incapable of handling the most delicate balance or complicated apparatus. Still, why are there so few competent scientists among so many millions of us ? The cause is to be sought in the lack of opportunities and means. How many a potential J. C. Bose and P. C. Roy is obliged, after concluding a brilliant career in the college, to become a lawyer, doctor or schoolmaster for the sake of his daily bread, who can tell ? No sooner does an Indian student take his degree than he is expected to support a family, not unoften a large family. We look to the Government not only for support and help in getting a thorough and practical education in natural science but also for providing us with employment in several large Government factories and colleges for technical education such as the Engineering and Agricultural colleges.

Where colleges are placed in charge of practical chemists, the Government should be asked to open a special practical

class for the study of Chemistry, and students may be provided with scholarships and grants given for original research work in the college. The colleges should also be fitted up for such work, or else a laboratory should be established in some central place to enable students to go there as scholars and continue work with prospects of employment in the practical line. It is the duty of every individual member of a nation to contribute towards the education of his fellow-countrymen. I have pointed out that the proper study of Chemistry is indispensable for the prosperity of a nation. It will no doubt require years for the people in general to understand the importance of it, but thousands of our educated countrymen appreciate it and should try to secure endowments for scholarships to enable students to carry on practical work after leaving the college.

We must appeal to the Government to give early practical effect to the Tata scheme. Much time has already been lost. It is hoped that when the Tata College is established, there will not be lack of support from our princes and chiefs and I trust the example of the Maharajah of Mysore will be largely followed.

SUGAR INDUSTRY.

By S. M. HADI, Esq., M. R. A. C., M. R. A. S., *Assistant Director, Land Records and Agriculture, United Provinces.*

The importance of the Sugar Industry in India is obvious. In the United Provinces alone something like four crores of maunds of raw sugar is produced annually, the value of which may be estimated roughly at not less than 12 crores of rupees. However, only about $\frac{1}{2}$ of this is refined and the rest is consumed in the raw state. Until about 12 years ago sugar manufacturers in the sugar producing centres of the United Provinces were more numerous and were making greater profit in their business than they are doing now.

A large number of factories has had to be closed on account of decline in the profits owing to the competition

with foreign sugars, which sell cheaper and are of better quality. The Government of India was so convinced of the injurious effects of the enormous import of foreign sugars on the native trade that it had to resort to legislation, imposing countervailing duties on all country-fed sugars coming into India, but even this legislation could not go a long way to help the native manufacturer because his methods of manufacture were defective.

In course of my official enquiries I had an opportunity of studying and determining these defects and of thinking out improvements which have now reached a sufficiently satisfactory stage and have stood the severest criticism that the native refiners could offer. They have been thoroughly tested and approved by the native experts of Bareilly and Rampur.

In making improvements my special aim has been to make more, better and cheaper *khand* without using appliances requiring a disproportionate capital outlay or introducing chemical processes that would require scientific knowledge on the part of the *khandsaris*. The new processes are fully described in Agricultural Bulletin No. 19 of 1905,* and are being demonstrated practically in the Benares Exhibition at present.

I have taken out no patent for these processes partly because they were worked out at Government expense and partly because I thought that their protection under the Invention and Designs Act might retard their free adoption by the Indian people.

The processes are very simple and do not involve the uses of bone charcoal or any other material to which Hindus or Muhammadans could have religious objection. They can be adopted as well by a *khandsari* who could only afford to invest about Rs. 1,500 as by one who was prepared to sink Rs. 1,50,000. The outturn of sugar in these methods is about 50 per cent. more than in the ordinary native method and the cost is less. There is theoretically no waste of sugar

* See Appendix I.

in this method. Practically there is very little; the molasses obtained being converted readily into a form of *Gur* which commands a fair price in the market. The improvements consist chiefly in the use of better mills for extracting juice, in boiling the juice in a fresh state, in using copper pans instead of iron vessels, in separating the molasses by means of a high speed centrifugal Hydro-extractor and washing sugar with vegetable decolorisers.

The sugar produced is of a quality which suits specially the requirements of the native confectioner.

It can be stated with absolute certainty that the profits in this process cannot be less than 25 per cent. per annum on the total outlay.

THE ART-INDUSTRIES OF THE UNITED PROVINCES.

By G. D. GANGULI, Esq., *Curator, Provincial Museum,
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If we include the district of Delhi which has within recent times been transferred to the Punjab, the tract of country designated the United Provinces contained within its limits the centres of an advanced civilisation from a remote antiquity. It is here that successive dynasties of Hindu and Muhammadan kings established their capitals in historic times. To the position which the Provinces thus acquired at an early period of the history of India may be traced the growth of the industries which form the subject of this paper. In its unlimited natural resources the country offered all the advantages which foster indigenous arts. Extensive timber yielding forests which line the lower slopes of the Himalayas, large tracts of cotton-producing soil, the presence of stone quarries in neighbouring states, easy mode of transmission by the rivers which intersect it from end to end, and, above all, the enormous capacity of its soil to yield food-grains of every description are the factors which induced an industrious people to cultivate the arts of peace and thereby meet the ever-increasing wants of a luxurious court.

The chief art-industries of the Provinces are briefly noticed in the following paragraphs :—

I. Decorative carving as applied to architecture and articles of use.—The question whether the use of wood preceded that of stone, is a disputed point with archæologists. The ruins of ancient sites and temples scattered in different localities establish the fact that stone sculpture was practised in Hindustan from the dawn of authentic history. It has continued to thrive in districts which lie in close proximity to stone quarries, such as Agra, Muttra, Benares, and Mirzapur, where the art is chiefly applied to architectural decoration, witness the fine carvings on the temples at Muttra, or on the palaces at Fatehpur Sikri and in the Fort of Agra. At the latter place it was extended to the softer fabric of marble and alabaster, for carving which the stone-masons of Agra have acquired a world-wide reputation. Besides the sandstone trellis-work which adorns house-fronts and mausoleums in the late imperial city, the inlaid marble ware of Agra ranks as its chief manufacture. This art owes its origin to the decoration of the Taj, the building of which created a class of workmen whose descendants, both Hindus and Muhammadans, practise it at the present day. The material for the sandstone screens is procured locally from the quarries at Tantpur, while Rupbas in the Bhartpur State yields the soft stone which lends itself easily to delicate carving. The marble for the inlaid ware is imported from Makrana in the Jodhpur State, and the precious stones (agate, jasper, cornelian, mother-of-pearl, etc.) which are imbedded into it by a process of annealing, are procured from different parts of India and countries beyond it. The carving of soapstone, which is practised by the same class of workmen as produce the inlaid ware, is of recent origin. The models of the Taj in soapstone and alabaster are familiar objects to cold weather tourists in these parts. Fine stone-carving as carried on at other centres of the Provinces is architectural in character and depends for its development solely on the material prosperity of their inhabitants. The allied art of carving in wood, from the nature of the material

and the facility with which it is handled, extends over a larger area than carving in stone. There is scarcely any town in Upper India which has not its local carver or carpenter to make ornamental door-frames or façades for houses. From its durability, *sal* (*Shorea robusta*) is the wood which meets every requirement of the people who indulge in ambitious schemes of architecture. The abundance in which it is supplied by the forests in Oudh furnishes the means for carrying such schemes into effect. Hence grew up a class of workmen who applied the art of carving to every part of domestic architecture, from the ceiling of a room to the entrance of houses. Lucknow, the home of so many industries in the immediate past, produced a style of decorative carving which was carried to perfection in the later days of native rule. The use which the Lucknow carvers made of the *sal*, those of Saharanpur have made of the *shisham* (*Dalbergia sissoo*) with perhaps greater effect. Few examples of delicate carving can excel a carved doorway in *shisham* executed by Saharanpur *mistris*. The wood-carvers of Balandshahr, Aligarh, Farrukhabad and Mainpuri hold no inferior position to those of Lucknow and Saharanpur. The latter place at one time carried on a large trade in carved articles in a soft white wood called *dudhi* (*Holarrhena antidysenterica*) which is obtained from the Siwaliks and the lower Himalayas. This trade in genuine handiwork has now been almost supplanted by the manufacture on a large scale of carved furniture in *tun* (*Cedrela toona*) turned out by fret-saws. The ebony-carving of Nagina in the Bijnor district deserves particular mention. Here the art is applied to innumerable articles of household and general use, such as tables, chairs, toilet-boxes and stationery cases, which annually find their way to remote markets in London and New York. Of late years, a variety has been introduced into the ware by inlaying the carved articles with bone or ivory, or by mounting them with silver, which greatly relieves the uniform black of the ebony *Diospyros melanoxylon*. The *tarkashi* work of Mainpuri may also be mentioned here. Graceful geometrical

patterns are engraved on well-seasoned *shisham* wood and fine brass-wire is beaten into them. Similar work but of an inferior quality is produced at Pilibhit near Bareilly. The carved and lacquered furniture of Bareilly is known all over the Provinces. Here the industry is in a most thriving condition, giving employment to a numerous class of artisans who may be roughly divided into carvers and polishers. The trade in the plainer articles—office chairs, tables, book-cases, almirahs—is to a large extent supported by Government. There are few public offices in the Provinces which do not indent upon Bareilly for their furniture. Both *shisham* and *tun* are employed in making the carved articles. The fine tracery in gold and silver leaf on a black or white surface is the distinctive feature of the lacquered furniture, such as drawing-room chairs, sofas, couches, etc.

Ivory-carving as an industry is not indigenous to these Provinces, although the kindred art of carving camel-bone is practised to some extent in cities like Benares, Lucknow, Agra and Saharanpur, where the hands employed in the trade occasionally produce carved articles in ivory to meet special demands. Paper-knives, stick-handles, fret-work combs, picture frames, card-cases, etc., are the things which meet the eye in a bone-carver's stall. Want of patronage on the one hand, and absence of demand on the other, are the causes which have checked the growth of an industry which had been introduced into these Provinces under more favourable conditions in the past.

II. Art-manufactures in metal.—The metal ware industry of the United Provinces is more widely extended than even wood-carving. It grew up from the wants felt in every day life for utensils of a substantial kind for domestic or sacrificial use, and among a people who reckon brass and copper vessels as a material part of their wealth, the trade in these wares required little extraneous aid for its development. The *thathera* and *kasera*, as the workers in brass, copper and the mixed metals are indifferently called, ply their trade in every district with varied artistic skill, which in many cases does not go beyond the shaping and finishing of the wares.

for local use. The bell-metal utensils of Malipati in Azamgarh, and of Hasanpur-Bandhua in the Sultanpur district of Oudh, are of superior finish, and are much prized by the natives as a perfect alloy which resists the action of acids. The metal-workers of Lalitpur and Jhansi rise above the level of ordinary artizans by producing effective ornaments on plain brass or bell-metal. The copper-studded *lotas* of Maraura and the curious combination known as a patwari's inkstand may be named as examples. Muttra produces brass images of Hindu deities which are eagerly bought by Europeans as paper-weights and by Hindus as household gods. Similarly, Etawah and Gorakhpur have each a reputation for brass chandeliers used on festive occasions. Cawnpore, Farrukhabad and Aligarh might be added to the list as towns producing metal manufactures of some distinction. But the chief centres where the manufacture of ornamental brass and copper is carried on extensively are Benares, Mirzapur, Lucknow and Moradabad. The growth of the industry at Benares is traced to the requirements of the temples which abound in the place and also of the pilgrims who visit them in endless numbers from remote parts of India. Every one, whatever his means, must carry to his distant home some memento of his visit to the sacred city, whether it be a small *lota* for holding the purifying water of the Ganges, or a more costly article in the shape of a throne for the gods. The manufacture of articles suited to European taste, such as flower pots, vases, and the like, is a later development. Indeed, the craze among foreigners for the engraved brassware has been the cause both of its growth and deterioration. With no better guide to regulate their skill than the fancy of their numerous customers, the brass-workers of the present day have adopted models, which in point of elegance and purity of design, can hardly bear comparison with the art products of former years. Yet the industry is in a thriving condition, a result which can only be attributed to the opening of new markets for this famous ware. The bulk of the sacrificial and domestic utensils sold in the bazars of Benares come from Mirzapur, which is the

place for this class of goods. The ornamental brass and copper of Lucknow is made to suit Muhammadan rather than Hindu taste. *Pandans*, spouted *lotas*, trays, and the *alams* or banners carried in Moharram processions, are some examples of the Lucknow ware, in which the patterns are beaten out and not engraved as in the case of Benares brass. Starting with plain tinned utensils designed for household use, the town of Moradabad has acquired a celebrity for the effective metalware which bears its name. Brass is tinned over and the patterns are cut through the tin so as to expose the brass in floriated lines on a white surface. This was the original method of ornamentation, which has gradually developed into one of a highly artistic character, in which the effect is produced by engraving the patterns on the brass and filling in the intervening space with black lacquer. Latterly, the tendency has been to introduce a variety of colours (red, green, blue) on the same article, which does not always produce a pleasing effect.

Besides the ornamental brass and copper mentioned above, Lucknow produces three distinct kinds of artware in the precious metals, *viz.*, chased silver plate and jewellery, *bidri* ware and enamels. What with high wages and absence of demand, the trade in silver-plate and *bidri* is in a declining condition, while that in enamels has almost died out for much the same reason. These industries had each a foreign origin; they flourished so long as there was a native court to support them, and have declined with the transfer of capital to other centres of population, such as Jaipur, Gwalior and Hyderabad. The form of the *bidri* known as *zarbuland* is peculiar to Lucknow. In it the patterns are encrusted on, instead of being damascened into, the composite metal which forms the ground fabric of *bidri* proper. Lucknow has also a reputation for its diamond-cut jewellery, the trade in which article is mainly supported by Europeans. The town of Gokul in the Muttra district carries on a local trade in silver toys. The casting of brass idols on a larger scale than those of Muttra is a speciality of Hamirpur. Among more pretentious samples of artware from this

district are the silver fish of ingenious make used as a scent case and the *arsi*, a favourite thumb ornament worn on the left hand by Indian women. But such articles are made in every town of Upper India by skilled silversmiths, who to execute an order only require a pattern to be shown them. A filigree scent-holder or *irdan* made by a Jhansi silversmith is no contemptible specimen of such work compared with the finished products of Cuttack or Dacca,

Art-manufactures in iron or steel are produced only to a limited extent in the United Provinces. The town of Nagina in the Bijnor district was at one time famous for its gun-barrels and detonating locks for fowling-pieces. The trade in these articles is now confined to a few families who make match-locks to order. Meerut has a reputation for its cutlery. The lock-works of Aligarh are of recent growth and too well-known to require special notice.

III. Textile manufactures.—This is a broad class. The manufactures which fall under it naturally divide themselves under the three heads—cotton, silk, and wool fabrics. Of the first, the Provinces produce every variety known to trade. The figured muslins (*jamdani*) of Tanda and Jaisat one time supplied the wants of the Oudh Court. Quite within recent memory, Lucknow produced its own *malmal* and *tanzeb*, as it still manufactures the stuff called *addhi*, which is peculiarly fitted for the fine embroidery in silk and cotton thread, called *chikan*, or that in gilt thread called *kamdani*. Competition with the mills and a change in the habits and tastes of the people have caused the downfall of the hand-weaving industry everywhere. Felt caps are fast replacing the courtly *pagrīs*, as figured jail-matting has supplanted the use of printed floor cloths of elegant design. For their superior texture the muslins of Mau in Azamgarh and of Sikandarabad in Bulandshahr, still hold their own against foreign imports. Cotton-printing has not been so much affected by the competition as the hand-weaving industry. On the contrary, there is a growing demand among Europeans for printed counterpanes and curtains as manufactured by the *chhipis* of Lucknow, Farrukhabad and Bulandshahr—an evident sign

of the expansion of a trade in these goods under foreign support. Space does not admit of even a brief description of the somewhat elaborate process by which a plain fabric is printed in colours before it is finished for the market, nor does it lie within the scope of this note to mention the various minor industries which are supported by the trade in printed cottons. It is carried on to a greater or less extent in every district which produces cloth of any kind, and gives employment to a numerous class of craftsmen who are variously styled dyers, die-makers, stampers, washers and printers. Next in importance to Lucknow, Farrukhabad and Bulandshahr, rank Fatehpur, Bareilly, Muttra, Agra, Basti and perhaps Mirzapur, as the chief centres of the dyeing and calico-printing industry. Meerut, Farrukhabad, Etah, and Bara Banki produce coloured fabrics of different degrees of fineness. Aligarh is known for its diapers as for its durries. Moradabad checks furnish suitable material for summer clothing. The town of Sandila in the Hardoi district of Oudh claims more than a passing notice for its *palangposes* which combine durability with effect. Mau in the Jhansi district is noted for its *kharwa*, a red-dyed mattress cloth, which, if it lacks in artistic neatness, is preferred to bed-ticken for its long-wearing quality.

Benares is as widely celebrated for its brocades as for the engraved brassware mentioned elsewhere. It is the centre of a thriving trade in silk manufactures of every description, from the finest piece of *kinkhab* which decorates rank and nobility, down to the plainest scarf or *chaddar* worn by men of moderate means. Agra silks are less known than Agra lace. The former are manufactured from yarn imported from the Punjab and Bengal. Mubarakpur in the Azamgarh district is the seat of an important trade in satinettes. The town produces two varieties of mixed fabric, known in the local market as *sangi* and *galta*. The former, a coloured compound of *tasar* and cotton, finds ready purchasers among the well-to-do classes of the Musalman community, while the latter, a web of silk and cotton, is woven in dress-pieces for export to Nepal and Europe.

Fine wool fabrics are not produced in any district of the Provinces. Shawl-weaving as an industry flourished in Lucknow for a time only. It could not hold its own against the finer products of the Srinagar looms. The weavers or their descendants, originally settlers from Kashmir, now make a precarious living by mending old shawls or repair work done for families which still maintain a taste for the costly fineries of a by-gone age.

Muzaffarnagar blankets have a reputation beyond the Provinces. Properly speaking, the blankets are a speciality of the Meerut district, the town of Muzaffarnagar, on the North-Western Railway, being the mart whence they are exported to Bombay, Calcutta, and other trading centres. Coarse woollen wraps and *kammals* for use by the poorer classes are made in many districts where wool is cheap. The preference given by the people to quilted clothing throughout the Provinces hardly leaves a chance for the development of the blanket-weaving industry at centres where it already exists. Competition with the mills at Cawnpore is a second obstacle in the way.

IV. Embroidery.—The artware for which Lucknow has acquired a sort of pre-eminence is its gold embroidery, which rivals that of Delhi in its best style. It is decidedly superior to the products of Agra and Benares, which lose their brilliancy by long use or exposure. The art grew up from the demands of the native court for embroidered mats and pillow-covers, saddle-cloths and elephant-trappings, which added to its splendour. In the absence of a demand for things on a large scale suited to native taste, it is now applied to caps, slippers, table-covers, etc., which find a market among Europeans. The *kamdani* and *chikan* work of Lucknow have been alluded to in a former paragraph. *Chikan* work or embroidery in silk and cotton thread was introduced into Lucknow from Calcutta. At the Oudh capital it has acquired a character of its own, which marks it out as an industry which is not likely to decline for want of support, since both European and native taste has created a market for it. It gives employment to young and old of both sexes who try

their hand at this effective needle-work at odd times when free from the regular occupations of the day.

V. Carpets and Durries.—Carpet-weaving on the best Persian models was introduced into this country by the Muhammadans, and the art was carried to perfection during the flourishing days of Mughal rule in Hindustan, when royal factories had been established at Lahore and Agra for the manufacture of carpets for durbar use. With the departure of greatness from these capitals, the industry languished and carried on a straggling existence in places like Jhansi and Mirzapur, which still produce pile carpets of varying quality. These do not reach the high standard of excellence attained by the jails, which, notably those at Agra and Lucknow, now manufacture carpets and rugs on a large scale. The loosely-woven carpets of Jhansi hardly deserve mention. The Mirzapur carpets were at one time admired for their bright fast colour, but are now identified with whatever is inferior in the name of dye or design. Aniline dyes and foreign models are responsible for the decline of a trade which gave fair promise of development not many years ago. Carpet-weaving after pure oriental models is carried on to some extent in the isolated town of Jewar in the Bulandshahr district. Woollen carpets of superior texture are also manufactured in the Maharajah of Benares's Family Domains in the Mirzapur district. Felts or *namdas* are a speciality of Bahrach. Durrie-weaving as a popular industry, thrives in Bareilly, Agra and Aligarh. Jewar in Bulandshahr has again a fame for its fancy durries.

VI. Pottery.—Pottery-making appears to have been the first attempt at art essayed by the Indians. The result of excavations in ancient sites in different parts of the country furnishes ample proof of this. Unglazed and painted pottery requiring little artistic treatment is produced in every district, but the art of producing indelible colours on baked clay by vitreous glazing is confined to a few, among which Mirzapur, Bulandshahr, Lucknow, and Meerut, stand foremost. To these may be added Moradabad, Azamgarh, Aligarh, and Gonda, as districts producing art-pottery of some merit.

In the Azamgarh or Nizamabad ware designs in silver leaf on a black, and latterly, reddish-brown surface form an effective ornament. Chunar in Mirzapur produces both unglazed and glazed pottery. The former in effect is similar to the Nizamabad ware. The glazed variety is of recent introduction ; vases, wall-brackets, ewers, etc., are familiar samples. The Amroha (Moradabad) pottery is of a most brittle kind, being vessels and other objects moulded of thin clay, on which patterns are produced in colours and in gold and silver leaf. Owing to its fragile character it commands but a limited market. In the Gonda or Utraula pottery flowers are painted on a green surface. So far, this ware is unaffected by foreign influence and therefore retains a local character. The Aligarh black pottery is European in shape and design, which latter consists of fruits and flowers encrusted on the surface before baking. The glazed pottery of Khurja in the Bulandshahr district deserves particular mention. It is the best kind of art-pottery produced in the Provinces, but, unfortunately for the trade, its manufacture is confined to a single family, the members of which, as it usually happens, are too jealous to impart their secret even to distant members of the same family. The demand for this highly effective *faience* sometimes far exceeds the supply. The art was introduced into Khurja from Bahadurgarh in the Meerut district, where, through the inaccessibility of the place, it has little chance of development. Of the two kinds of pottery which Lucknow produces, it is the painted variety which deserves any notice. The clay models of fruits and vegetables, and figures, single and in groups, illustrating the various trades and occupations of the people, so vividly painted by the *kumhars* of Lucknow, are too well-known to require an introduction in this note.

VII. Minor Industries.—Besides the trades and manufactures treated of in the preceding paragraphs, several handicrafts of an artistic character, but of minor importance from an industrial point of view, have their home in these Provinces. In its palmy days, Lucknow created a school of native music, to which a local trade in musical instruments

of curious design and ingenious construction, owes its existence. Benares claims equal notice for producing similar accessories to the art of music. Painting on ivory, depicting scenes from the life of Krishna and Rama, is done to perfection by a few artists in the sacred city. Visitors to Agra and Benares are familiar with the lacquered toys, tables, and boxes, sold in the bazars of those cities. Bulandshahr produces a better style of lacquer-painting in its charpoy legs and trays. Jaunpur is the seat of a limited *papier maché* industry which was started by the Government with imported workmen from Kashmir. The *papier maché* work of Mandawar in Bijnor originated from the same source, but has acquired a distinct character. Tilhar in the Shahjahanpur district has given its name to the effective painted ware known as "Tilhar trays." The same style of decorative painting is copied on brass with better effect in Lucknow. Agra lace and embroidered *hukka* stems and snake pipes (*nechas*) are preferred to similar products of other towns. The peacock feather trimming and fans of Jhansi add to the style and fashion of native courts. The leather goods of Cawnpore and Saharanpur, though possessing no great artistic merit, have their economic value. The embroidered rugs and mantel-fringes of buff-coloured sambhar hide from Gorakhpur deserve special mention. Agate knife-handles, paper-cutters, brooches, solitaires, and other products of the lapidary's art are a speciality of Banda, while seal-engraving and cutting of precious stones form a by-industry in Lucknow, the largest centre of indigenous arts in the two Provinces.

VIII. Rampur manufactures.—No account of the Provincial manufactures would be complete without a brief reference to the industrial arts of the Native State of Rampur, which lies below the Kumaun hills. The Oudh and Rohilkhand Railway now passes through it. Under the enlightened administration of the successive rulers of this little State, the arts have received their due share of attention. Steel-ware, pottery, and *khes* (a cotton damask of the finest quality) are specialities of the place. The gun-barrels manufactured in the town of Nagina in the neighbouring district

of Bijnor have been noticed. A double-barrel gun made by a Rampur *Mistri* in the service of the late Nawab was equal, in point of material and finish, to any that leaves a Birmingham factory. Rampore *khes* is known throughout the Provinces. Any amount of washing does not affect the woven embroidery of the costly pieces. The price of a single piece varies from Rs. 5 to Rs. 60.

The above is but a brief summary of the art resources of the United Provinces. Detailed information regarding processes of manufacture, names of principal workmen, prices of typical samples, will be found in exhaustive works on the subject and in special monographs, of which a list is appended. Readers of this paper will have noticed that many industries which in former years supported the industrial classes are verging towards decline from day to day. It is not to this or that cause that some of the industries owe their decline. The importation of foreign goods may have, as in the case of piece-goods it certainly has, ousted the Indian trader from the market. The chief cause of his poverty is his own indifference to the altered conditions of life. That the Indian craftsman is highly conservative in his habits is known all over the world. He will not work save with the tools and ideas he has inherited from his fore-fathers. Improvement upon old methods he cannot bear to think of. Enterprise is a word which conveys hardly any meaning to him. He will not set his hands to anything new unless the reward for his labour is guaranteed him. This last trait of his character should be borne in mind in maturing any schemes for his advancement. A great impetus has been given to the industrial arts of the Provinces by the International Exhibitions held in different parts of the world, since the first show of their kind was instituted in Great Britain about the middle of the last century. Exhibitions in a way do some good, but they do not open out permanent markets for the produce of the industries which they are designed to illustrate. To secure a high standard of excellence in art, a taste should be created among the people to appreciate it. A finely chased *hukka* bowl holding several

pints of water, or a richly embroidered coat of ample dimensions may not be the fashion in these days, but the will and the talent which could produce these and other curiosities now deposited in museums, can be employed in producing innumerable articles of necessity and luxury to the benefit of both producer and consumer. Due encouragement should be given to the former by buying things at their proper value. One great disadvantage under which the Indian artisan of the present day has to labour is the limitation of time and price set by customers when ordering artwares from him. It may be justified in the case of articles required for ordinary use, but when a specimen of genuine art is the desideratum, the art-workman should be given the choice to set his own terms. There are no trade guilds in this country to guard his interests. For want of legitimate support from his customers, he, like the Indian agriculturist, is always in the hands of the money lender. All his profits are anticipated, and he is forced to work at so much a day for the benefit of the middleman or dealer who employs him. The Government has done a great deal to improve his prospects by establishing industrial schools and art museums at the capital cities of India, whence the art products of the country are advertised to a wide circle of visitors from distant countries. At Lucknow an art-ware dépôt is attached to the Provincial Museum in which goods are received from the manufacturers and sold on their account to the general public. The maintenance of this dépôt is a direct charge on the State. Such dépôts established by private enterprise or by the District Boards at other centres of industry, accessible by rail, would go a great way to improve the condition of the local artisans.

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PROPOSAL OF AN INDUSTRIAL BUREAU.

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What do we wish to achieve by the industrial movement ? We desire first, to open economic and industrial facilities and to produce economic good. How could we be able to do this by mere discussions or dissemination of any quantity of literature over it ? We have to do many more things to make the movement really useful. If ever the movement should begin to produce effects in the economic and industrial world, then alone its proper mission will have been fulfilled. In India the problem embraces distinct activities, distinct

directions of effort, all of which must be started coincidently and, as far as possible, with proportioned energy and capacity. For instance, is it enough if, say, a hundred persons return from foreign countries after having mastered a hundred different arts and industries? The example of Mr. N. B., Wagle, the Bombay gentleman who returned an expert in glass manufacture and ended by accepting Government service in Gwalior, ought to be full of meaning to us. If we go on merely encouraging scholarships, and importing hundreds of experts, we do not add a whit to the progress of the Industrial cause if we do not take previous care to afford sufficient scope for the employment of the acquired merits of our experts. So also, the widest dissemination of literature will not in itself help in the least to produce any tangible results. What we must have is—a well organised, continued, regulated effort—an effort capable of effecting a combination of intellectual forces with those of capital and enterprise. How to achieve this, is the question. Let the Industrial Conference primarily keep before its view the end above set forth which means that it must include essentially the following subjects to decide on :—

(1) An Agency of work which would bring into increasing intimacy with the natural aspirations for economic success, the forces of the commercial and industrial world. We have to do with merchants, traders, manufacturers and capitalists when we propose any step of this kind. Even a skilled England-returned scholar of ours has, if he is to consummate the end with which he went to England,—first and last only to do with that class, the mercantile community. If we want to spread the knowledge of any manufacture, and make it productive, we must invite and deal with those who have the capacity to undertake it. Therefore, there must be some link, bond or channel by which the commercial and capitalist forces may be held in unison with the energies of the Conference or the movement in general.

(2) To rouse the attention of the commercial classes, the proceedings of the Conference or the Agencies it might establish, must be, as far as possible, in the Vernaculars.

Even the pamphlets or papers or lists which might be issued should be in the Vernaculars, appealing directly to the classes concerned, most of which are ignorant of English.

What sort of an agency must this be ? I think that the Conference be asked to institute a Bureau—a permanent institution with a few officers devoted to this work—subject to the control of the Industrial Conference.

(1) The Bureau should constitute correspondents from several parts of the country particularly members of the commercial and manufacturing classes.

(2) It should have a regular organ to voice its efforts, to keep the agitation alive, to maintain correspondence with experts, mechanics and capitalists.

(3) The Bureau must ascertain what fields there are in the several parts of the country for development—fields in manufacture or commerce.

(4) It should, after having first consulted manufacturers or persons wishing to undertake or invest in manufacture, recommend scholars to be sent to foreign countries to learn the manufacture so as to afford scope and employment to these men after their successful return.

(5) It should, also, induce capitalists and others to start particular industries or manufactures, if found triable after proper deliberation.

(6) It should call forth information of foreign markets, of foreign fields of trade or industry for Indians and spread it among likely men of enterprise.

(7) It should ascertain what arts or industries or handicrafts are still valued by us or foreigners, and see what should be done to improve them or maintain them.

(8) It should ascertain what castes there are whose hereditary function has been mainly mechanic or artisan, what their present condition is and what might be done to organise them or their Panches so as to assist their own progress and development.

(9) Its duties must embrace the widest activities, widest enlightening and organising agencies.

(10) It must keep alive a fund fostering, day by day, the Exhibition and itself.

If the Conference should start such a Bureau, then alone some tangible work is possible. It might have a paid staff with itinerary Secretaries. It might shift its head-quarters with the Conference or the Exhibition. You must mark that the Bureau is to be assisted principally by Correspondents in different parts of the country. Such a Bureau is more properly within the scope of Government, but since Indian interests are not identical with British interests we must have our own organisation. There is no other way of effecting economic salvation. Mere Exhibitions and Conferences will do nothing. The Bureau is manifestly intended to keep alive economic processes, to feed constantly the fires of living food for the country, to enliven industrial agencies, to vitalise the very soul of the people so that the Industrial organisation will not rot, or grow faint nor grow monotonous.

[After the reading of the papers the Conference proceeded to consider the resolutions submitted to it.]

[Mr. Chunilal Naranlal, who is in-charge of 1,500 power-looms, and Mr. Keshavlal Mahasukram, who is in charge of 800 power-looms, communicated to the President their offer to train Bengali young men, free of charge, in the use of the power-loom. They were authorized by the *Industrial Club of Ahmedabad* to render every assistance to such students.]

SPEECHES ON THE RESOLUTIONS.

After the reading of the papers was over, the President called upon the Hon'ble Munshi Madho Lal, to move the first Resolution, which runs as follows :—

I.

Resolved, that this Conference urges the Government of India and all Provincial Governments and administrations, and also the people of India according to their opportunities,—

(1) *To found Technical Schools in all large centres for the Industrial education, on an adequate scale, of the Indian people;*

(2) *To encourage and help Indian manufactures;*

(3) *And to foster and extend the use of such manufactures in India in preference to foreign goods.*

The Hon'ble Munshi MADHO LAL (Benares) said : I put before you for your consideration the first resolution which has been entrusted to me by our President. We ought to do something. I will not say much on the subject, I will say only one thing. I think that those who have capital must come forward and apply it to industrial purposes. It is not a sacrifice ; it is to your own interest to see that you can manufacture what you require and not depend upon other countries. This is a thing which you must take to heart ; put your hands in your pockets and see that you do something for your own country. (Cheers.)

Mr. A. CHAUDHURI (Calcutta) : The resolution has been read to you and I will not take up your time by making a speech about it. The resolution speaks first about the foundation of technical schools, and, secondly, about the encouragement of Indian manufactures which is another way of encouraging the advancement of the Swadeshi movement, and the consequent use of such manufactures in preference to foreign goods. Now, gentlemen, in regard to this, the

state of things in this country is this. So far as the richer classes are concerned we need hardly think of them. They have got means to waste their time and we can leave them alone. So far as they are concerned, they can work out their future. So far as the middle classes are concerned, it is a matter of serious import. Now, gentlemen, our education has unfortunately taken lines which we could not foresee; unfortunately our education has not conformed to the permanent environments of our country and we find this so far as the Calcutta University is concerned, out of 6,000 young men who go up for the Matriculation examination of that University, we find that 125 only—mind, not 125 out of 1,000—are qualified in a certain way, to earn a sort of living by the practice of a profession like that of Law, two of them Medicine, one or two of them Engineering, and so on. As regards the rest of the young men, they are absolutely thrown on the streets, unless they are picked up for Government employment for which there will be a great deal of hankering in any part of the country. The Government cannot be blamed if it cannot be taking clerks eternally.

Then there are mercantile houses which employ a certain number of young men. High education is a certain disqualification for doing ordinary clerical work. There also the number that can be provided for is limited. What are we doing for the thousands of young men who are educated up to a certain standard and then absolutely thrown adrift? This question was forced upon our attention the other day in Calcutta. That was due to certain repressive measures taken by Government in connection with the partition of Bengal. It arose in this way. Some of these young men who are taking part in political movements were punished severely. The result of it was that the young men of Calcutta vowed that they were going to boycott Government Colleges. It was a serious question. It really meant that there was to be no education for some time to come for our young men. An appeal was made to us to devise some means for the education of our young men, and the result of it was,

I am glad to be able to tell you, that we were able within 15 days from the date when these men resolved to boycott Government Colleges, which we were able happily to prevent, we were able to get promises of seven lakhs of rupees (cheers). They were not mere empty promises because we have very nearly got the funds in our hands and a trust deed is in course of preparation. One of the main objects is to start a Technical Institute. Our people are very anxious that this institution should be placed entirely under national control. I must also tell you in connection with this matter that the Government has at last in Bengal, so far as we are concerned, appreciated that there is great necessity in the country for technical education. It ought to have done so some little time ago, but at any rate it is better late than never. The Government made a proposal to our Scientific and Industrial Association to see what help the Government could afford to them. Gentlemen, that is another hopeful sign, so far as Calcutta is concerned. The Bengal Government was applied to by Mr. E. B. Havell, some time ago, for the foundation of a Weaving School. As you know, the weaving industry in Bengal is one of its largest industries. Mr. Havell made the application and said that there is a large class of weavers in Bengal who might be employed for weaving purposes. The application was not paid much attention to until lately, when the Government woke up to the fact that there should be a Weaving School and decided that Serampur should be the first place to have a Weaving School. The Government of India have now offered Rs. 35,000 a year for the purpose of starting a Weaving School (cheers), but they want that Rs. 1,10,000 should be subscribed by the Bengal Government for the purpose of staff, buildings, and so on. The Government of Bengal seem to be rich enough to have two administrations, but they have not got Rs. 1,10,000 for providing a permanent building for establishing the school. An attempt is being made by some friendly Government officers to induce our public men to come forward and give subscriptions towards this Rs. 1,10,000. Now, gentlemen, you must have heard of the National Fund

started on the 16th October, in Calcutta. It is not a rich town, but yet it has subscribed in cash one lakh of rupees which is going to be devoted mainly for the purpose of weaving. Our people are not anxious that the funds should be made over to Government for the purpose of the school which the Government intends to start. They do not want Government control over it. We do not quarrel over it. But surely the Government of Bengal should be able to find Rs. 1,10,000 to start the proposed Weaving School. The third thing that I have to mention is in connection with the fostering and extension of Indian manufactures and the use of those goods in preference to foreign goods. Now, gentlemen, you will be surprised to learn that in Bengal within the last four months we have been able to revive the weaving industry to such an extent that we were able, in a certain measure, to provide for our immediate wants (cheers). Gentlemen, we were, none of us, not our fathers nor fore-fathers, we were, none of us, naked before Manchester came in, and we hope with your assistance that the time will come when we shall not depend upon Manchester to hide our shame. I have not the least doubt that apart from all questions with which this question has been mixed up, political and otherwise, the main question is one of struggle for existence. I have not the least doubt that the time has come, and you appreciate its coming, when we must put our shoulders to the wheel and try to do our best for the country. It is no use talking about politics and about our rights, unless we are able to show that we can stand on our own legs and it is no use assuming the attitude of Kangaroo with two legs shortened in the front. That attitude will not do at all. We must be men and try to make our living according to our own methods and try to help our poor men with regard to their methods. (Cheers.)

Mr. N. SUBBARAO PANTULU (Madras): Mr. President and Gentlemen,—The resolution which has been read over to you is really a resolution about the Swadeshi movement of which so much has been heard of late. There are some misconceptions about this Swadeshism. In my opinion

Swadeshimism is based on love and it has nothing to do with what is called boycot. Boycot is more or less mixed up with what is called anger, resentment and probably hate ; whereas Swadeshimism, pure and simple, is based on love of our country, love of our countrymen and love of our fellow-beings in the land, and as such Swadeshimism is one which every one of us should take up and see that its principles are laid to heart. Once we realize the full significance of this message of Swadeshimism, we see its far-reaching consequences ; and various are the measures we have to take to give effect to this love. Now the love for our country and for our countrymen means that we should do all that we can to better their position in all its aspects. Of course the Industrial Conference takes up only one aspect of Swadeshimism, that is industrial. It calls upon us to develop the resources of the country, to improve its arts, its industries and its manufactures which have been on the decline during the last one century and more. Now, Swadeshimism that is love, which is preached by this message of Swadeshimism, is based upon self-help, upon self-respect and upon co-operation. These are the various principles on which this movement of Swadeshimism is based, for, unless we have faith in ourselves, it is impossible for us to go further. As Sister Nivedita told us this morning, we must believe that we have a message to deliver to the world, that there is some reason why God has preserved India and Indian civilization in the conflict between various civilizations in the world during the last 5,000 years. Our civilizations still lives, though India has been conquered by many nations and many countries. Therefore, the first thing we have to believe is that we have got a message of love, that God has intended India for something useful and great ; and unless we have got that belief, this Swadeshimism will not move forward and be of help to the country. Unless we have faith in us and strength in us, we cannot stand on our own legs, for the gospel of Swadeshimism is self-help. We must do all we can to help ourselves and not depend upon others. Once we understand that we have to confine ourselves to our own

resources, we will realise that we must co-operate to make this movement a success. Therefore self-help and co-operation are the two watch-words of this Swadeshi movement. Therefore, let each of us bear this in mind and realise that Swadeshism is not a mere idle talk or lip homage to the industrial development of the country ; it means hard work, real sacrifice in the cause of our country. It is a happy augury, it is a matter of congratulation that this first Industrial Conference should be held in Benares, the holy city of India, the centre of culture, as it were, for the whole of India, the centre from which light has streamed forth in all directions, the centre to which all Hindus turn their attention even to this day for their inspiration and their salvation. Therefore, I say it is a happy augury that this first Conference should be held in this holy city of Benares (cheers). Let us, therefore, take inspiration from this city, work in our different centres for the promotion of this movement, remembering the various watch-words associated with this movement. Once we understand the real significance of the Swadeshi movement, we can understand how we should work in various directions in connection with all the activities and reforms which have been in the air for ever so many years and which were not based upon Swadeshism. Social, religious and other reforms which have not been based upon proper Swadeshism have been partial failures. I hope and trust that the Swadeshi movement, which inculcates the real principles on which all movements should be based, will succeed and will make every movement thrive so as to suit and adjust themselves to the various peculiarities and prejudices of our countrymen, so that they may join us in making a success of this most important movement. For, essentially the movement of Swadeshism is a movement of the masses, a movement of the many, not only of the educated few but also of the non-educated many. That is why when you mention Swadeshi there is a throb throughout the whole country ; the cultured and the uncultured, all join together in giving their mite towards the success of the movement. National funds are started throughout the country

in different provinces—in Madras and other provinces—and you see how even the poor people come forward to give their mite towards the national fund. Gentlemen, this Swadeshi movement, in its industrial aspect, is concerned with our arts, industries and manufactures. There are many, but the chief requisite for any country worth living in on the face of the globe is that it should produce materials for its sustenance and garments—materials to eat and clothe itself. As regards the first I dare say we have plenty of material for our sustenance. As regards the second we did manufacture garments to clothe not only ourselves but people of other countries. Times have changed. Now a different Government has come and the policy has been to advance and look after its own interests. The history of the decline of the Indian manufactures and industries has been well described in the book issued by our worthy President, Mr. R. C. Dutt. I would request all of you to read that book. Unless we know the conditions of our industries and of our arts, we cannot realise how great has been our fall. Now this resolution refers to two bodies, one the Government and the other the people. No doubt the Government has very much to do with regard to industrial development in India ; but the chief requisite of it is that the Government should appoint experts to whom we can go and from whom we can receive the information to help us in our efforts. They must establish bureaus for disseminating intelligence ; but above all much depends upon ourselves. As time is short, I do not wish to dilate upon this resolution. (Cheers.)

The resolution was put and carried unanimously.

II.

Mr G. SUBRAMANIA IYER (Madras) : The resolution which I have been asked to move runs thus :—

Resolved, that this Conference urges all Provincial Governments and Administrations as well as the proprietors and managers of private Schools and Colleges to add Commercial classes, and Industrial classes like those of weaving, dyeing, carpentry, etc., to the existing educational institutions, where practicable.

Gentlemen, I think this is a very practical and excellent resolution ; it embodies an idea that I have had in my mind for several years. I will give you only two reasons.

In my part of the country, in the Madras Presidency, so many as 12,000 boys fail in the Middle School examination and so many as 8,000 boys fail in the Matriculation examination, so that every year somewhere about 20,000 young men are thrown abroad into society absolutely with no qualifications for earning a livelihood except quill-driving. It is absolutely impossible to supply the profession of quill-driving to all these 20,000 young men. What do they do ? They find no occupation whatever. In many cases they practically loaf about. In some cases they become law-touts and in other cases petition-writers. Now this class of young men between the ages of 13 and 16, to the extent of many thousands in number, turned out of school with absolutely no qualification for earning a livelihood except reading and writing English or their vernaculars—they threaten to become a source of evil to society. Therefore it is absolutely essential that these thousands of young men should be provided with some means of livelihood. The resolution says some form of manual industry, and I shall add some of professional means of livelihood. They may become merchants or traders. It is very necessary that the present spirit of a craving for clerkships should be knocked out of our young men. The spirit of industry must be abroad and must seize hold of the minds of our young men. That will not take place unless the kind of education which is necessary for that purpose is given to them while young. It is therefore very necessary that in the earliest stages of education there must be bifurcation in two directions, the one leading to higher University examinations and the other to a practical side so that the majority who have no means of going up for University examinations may be in a position to follow the other line and acquire some means of practical livelihood. Therefore this resolution is a very good one, and I think it is very necessary that this should be done not only by Government in the earlier stages of education but also by

managers of private schools. The other question remains, is there sufficient opening for the employment of these young men ? I say if there be qualification, openings will also come into existence. There is no limit to trade, commerce, artisan work or manufacture in any country. If there are young men trained for professions of this kind, the professions will be forthcoming in any number. (Cheers.)

Mr. ALI MAHOMED BHIMJEE (Bombay): Mr. Chairman and Gentlemen,—I am very glad that you have come to this conclusion that we should have an Industrial Conference amongst us. The Political Congress we have had for the last 21 years. My idea is that before we get our emancipation by political agitation we will have to get something more to deserve that emancipation and that could only be done through this Conference or such a Conference as this. I can tell you, Sir, that it is not now that I thought of it, but it is since 1870 that I thought that our emancipation could only come through economic steps that we might take to save the money that now goes out of our country. Then only will our country prosper. Speaking to this resolution I am very glad to come forward to second it, because I have known instances in which B. A.'s and M. A.'s could be had for Rs. 25 or 50. If they had industrial and commercial education they could command more than that. My own sons, being practical Marine Engineers, are earning more money than these B. A.'s and M. A.'s could expect. So I say this resolution is a very good one. The education that ought to be given in schools ought to be given on lines prevailing in England. Every young man who goes to College or University should learn some sort of handicraft to fall back upon. Even Royal Princes, some of them are carpenters, some of them are engravers and some of them are boot makers. On their birth-day, and their parents' birth-day, they make presents of what they make by their own hand. We commend our young men to do the same. Why should our young men after going out of the University, depend upon clerkships or some such employment? I am glad that this Conference has come into existence and I

hope that some good will come through it. With these remarks, I am very glad to support this resolution.

Mr. PRITHWIS CHANDRA Roy (Calcutta) : I have great pleasure in supporting this resolution.

The resolution was put and carried unanimously.

III.

The President then called upon Mr. Probhas Chandra Mitra to move the following Resolution :—

Resolved, that this Conference specially invites the attention of Indian capitalists to the great importance of introducing the use of improved hand-looms among the weavers of India, and recommends the establishment of Weaving Schools, where boys may learn the use of such looms, with a view to their more extended use among the towns and villages of all Provinces in India.

Mr. PROBHAS CHANDRA MITRA (Calcutta) : Mr. Chairman and Gentlemen,—The resolution which has been entrusted to me has already been read to you by our respected Chairman. Gentlemen, I am one of those who really believe that our old hand-loom industry can compete and compete successfully with Lancashire. No doubt, there are people who say that with the powerful machinery of Lancashire it is impossible for our handlooms to compete. We all know, gentlemen, that Lancashire has two machineries, one labour-saving machinery and the other the powerful machinery of Government which puts on countervailing duties (hear, hear). So far as the latter is concerned, I am afraid that neither the power-looms nor the hand-looms in India can compete. But we live under a benign Government, we have great faith in the justice of the English nation, and we hope that in spite of the great pressure that Lancashire is sure to bring upon our Government, our Government will see the justice of protecting the industries of our country. I have no doubt that the hand-loom industry will be able to hold its own, and I propose, gentlemen, to prove it from an actual economic basis. The question which you have to consider is whether hand-looms can compete successfully with power-looms in India. For the present, Sir, I leave Bombay out of

consideration, because Bombay has already made a certain amount of progress in power-looms. I will, for the present, confine myself to the question of the utility of hand-looms and power-looms in other parts of the country. The cost of erecting a big mill with 2,000 looms will, I take it, come to about Rs. 2,00,000. That is to say, the cost will be Rs. 1,000, if you distribute the cost to each mill. The outturn will be 30 yards per diem. The cost of an improved loom of Havell's pattern, Serampore and other fly-shuttle looms, is about Rs. 35 each. The outturn is ten yards per diem. That is to say, the outturn of a loom comes to three times the outturn of the hand-loom. But then you can see, gentlemen, that power-loom costs you Rs. 1,000, whereas the hand-loom costs you only Rs. 35. Three times 35 is less than the cost of a power-loom. It may be said that in a mill you do not want a worker for each mill, whereas for your three hand-looms you want three workers. That is true. We all know that in Manchester one operative can attend to about 6 looms. In Bombay and other parts, between two operatives they can attend to 7 looms. In Bengal, between two operatives they can attend to three looms. That is the reason why cotton mills, financed and managed even by Europeans, have also failed in Bengal, as you have not the advantage of half a man. What are the wages of a workman in Bengal? It is something like annas eight per diem. So that the whole question is that of saving four annas per diem. As against that, you have the high price of machinery, you have the wages of the engineer, foreman and all the rest of them. So that, I maintain that, in Bengal, at any rate, and in parts of India other than Bombay—I leave Bombay out of account because it has already learnt to get its engineers much cheaper than in other parts of India—the hand-loom can most successfully compete with power-looms. My friend, Mr. Patel, who is an expert in the subject, has told us that the weavers of Bombay hold their own and compete with power-looms there. That statement of fact is the strongest proof that the hand-loom can hold its own against power-looms. Then, Sir, you will remember that if you

popularise the hand-looms, you do something to promote the home industries of our people. The hand-loom is worked by our village weavers in their homes. Every Indian loves home-life. Factory life is a life to which Indians as a class are averse. Other people, too, are averse. So that if you popularise the hand-loom industry, we proceed along with the tide and we do something that our nation wants. There is another thing which in my humble judgment would go to make the hand-loom industry a success. That is this. This industry we can take up with a small capital. India is a country where it is difficult, at the present moment, to amass together large sums, and industries which can be managed with a small capital will pay best. Those industries will have the individual supervision of the capitalist, whereas the big joint-stock concerns will not have the individual supervision of the capitalist. It is for that reason and for various other reasons to which I need not allude at the present moment that I ask you to adopt this resolution. By doing so you will be doing something to popularise the hand-loom industry. (Cheers.)

Mr. BABULAL GOVILLA (Aligarh) seconded the Resolution.

Mr. FAZLAL HOOSAIN (Aligarh) : In supporting this resolution I have to say this, that with the spread of the Swadeshi movement the only necessity is that we should see that we improve our industrial education and also improve our weaving industry. I have great satisfaction in saying that even in the present day our weaving industry is not in such a bad condition as some of us think. As my predecessor, Mr. Govilla, said, he has already started a weaving factory. In my place there are 5,000 to 10,000 weavers. We must give encouragement to them and make them learn new methods and introduce new hand-looms; and if we do this, they will be able to produce any kind of new cloth. They still produce good cloth. There is a kind of cloth called *calbet*, that is produced in Mohun, my district, which is as good as any fine cloth of Manchester manufacture. But the weavers are not very well off, they are not aware of

improved machinery, and the cloths of their manufacture are a little costly. If hand-looms of new type are introduced, this difficulty can be removed, and if it is removed, we can compete favourably with any other country. I support this resolution.

The resolution was carried unanimously.

IV.

The fourth Resolution runs as follows :—

Resolved, that this Conference urges Indian capitalists to establish at their own cost Schools for spinning, dyeing, pottery, carpentry, and the manufacture of ironware and brassware, in order to afford facilities to boys of all castes and classes to learn such useful industries as a means of their livelihood.

Rai Bahadur Lala BAIJ NATH (Allahabad) : Mr. President and Gentlemen,—I shall not take up much of your time in making a long speech upon this resolution. I shall tell you in a few words what we, in the Vaisya Maha Sabha, have done to bring this resolution to practical shape for many years. We have been discussing this resolution for the last ten years. About five years ago in Aligarh, we resolved to send a student to Japan. The gentleman who has just shown you a specimen of silk was sent by us to Japan. He came back as an expert in silk weaving. He is a credit not only to us but to the whole of the North-West Provinces. (Voices—“The whole of India.”) He has established a factory in wood and metal works in Burja. I believe the day is not far off when the complaint made against the present kind of hand-looms will be removed. Another student sent to Bombay has come out as an expert in weaving. The last time when we met in Benares, we discussed the question of having a Technical Institute of our own, so that in asking the capitalists of the country to invest their money, we have been anticipating this resolution. We have got in Meerut an Orphanage for not only boys of my own caste but boys of all castes from whom we can take water. The building of this Orphanage has been completed at a cost of Rs. 25,000. We are now training boys. Some of them have come to this Exhibition, and you will see them with their yellow turbans

weaving cloths as you go into the Exhibition sheds. These boys learn hand weaving and carpentry. Some of their specimens of work you will see in the Exhibition. Some of them have earned prizes. We propose to extend the sphere of the institution not only to the inmates of the Orphanage but to all boys. We want such schools established not only for boys of one community but for boys of all communities in the land. There is enough of capital in the country, and all that is required is the will to divert the capital from Government paper and investments in land to the promotion of arts and industries. I hope the time is not distant when the cry will not be that there is want of capital, but the cry will be there is more capital for investment in industries than is required. I have been asked by my Joint Secretary to announce to the Conference that the members of the Vaisya Maha Sabha will give a prize of Rs. 500 to the person who makes the best hand-loom and places it before the next Industrial Conference. I hope that some such hand-loom will be forthcoming before we meet next year. (Cheers.)

Mr. RAM BHAI DUTT CHOWDHRI (Lahore) : Gentlemen,— The subject of the proposition is really simple, so far as Indians are concerned. According to our Shastras the capitalist, really, does not live for himself. Though the whole food is taken by the stomach, yet all the nourishment and the strength and vitality goes to the arms and legs and head. Similarly the Vaisya, the capitalist, is bound to give all that he has to, and spend all that he can afford on, the good of the whole society, the Brahmana, the Kshatriya and the Sudra. Therefore, it will be no new request to make, especially in the city of Benares, where we always have to beg for something in the way of charity. I have come from the Punjab and become a Punda here and make a request. That request is that the capitalists should give their money. The time has come now not for building *Mandirs* but to give money to make the muscles of the people strong and to secure their livelihood.

One word I have to address to the young men of Bengal. I hear that there is a proposal there for having a University

of their own. Nothing could be nobler, no aim could be higher. The learned professor from Bengal who, this morning, proposed the resolution on education made that point very clear. But still, allow me to say that though education is very small in the country it is too much in Bengal, so far as general education is concerned. (Voices--No, No.) Let the Bengalis learn to make their muscles strong, to improve their physique ; and nothing could give them stronger muscles than manual labour. And, therefore, if Bengali young men enter a school of carpentry or manufactory of iron ware or brass ware, I am certain they will become a really strong and powerful nation and they will certainly be able, in the land which produced the best tigers, to become the mighty tigers of Bengal. Therefore, gentlemen, I request them to join these Industrial Schools, and to work for the establishment of more Industrial Schools. The idea is perhaps that, with regard to a boy joining these technical schools the head is not developed. That is a serious mistake. The other day, Mr. Finny, the Traffic Superintendent of the N.-W. Railway, while addressing an audience said that he had himself to go for some time into the workshop, and he knows it for certain from his experience, that nothing could make the head so sure, and the brain so clear, as working at the hammer. Therefore, gentlemen, with these few remarks I request the young men of Bengal to give particular attention to the development of the muscles of the body generally by joining these schools. I beg to support this resolution.

Mr. S. R. DAS (Calcutta) : I have much pleasure in supporting this resolution. I am not a speaker. I have never spoken in public before, but I feel so much about the industrial regeneration of our country that at the request of your President I have come out of my shell, as it were, to address just a few words to you. I believe, Sir, in the old adage, that heaven helps those who help themselves (hear, hear), and, if we do not help ourselves, no one will help us. Sir, I am glad to find in this resolution that there is no appeal to this power or that power to do anything for us.

This is an appeal direct to the men, to the capitalists and to other people born in India, and I, therefore, have the greater satisfaction in supporting a resolution of that kind. There is no doubt, Sir, that many grand schemes are put before us by the powers that govern us ; but unfortunately the people who are put forward to carry out these schemes are not such as we have much faith in. For instance, take the Agricultural School at Pusa. The Government is spending thousands and lacs of rupees over it, but instead of bringing a real agricultural expert or a really scientific man to direct it, they put an indigo planter at the head of the institution. Seeing these things I certainly do believe that till we learn to help ourselves, we will not improve to that extent that we ought to do. We have capitalists enough, we have money enough, but we have not got the will. This Swadeshi movement, which seems to have taken hold of every one from the richest to the poorest, if this does nothing else but induce all our capitalists to come forward and help their poorer brethren to earn a living, I say the Swadeshi movement will have done much more than we expect from it. (Cheers.)

The resolution was carried.

V.

The fifth Resolution was then read to the meeting by the President. It runs as follows :—

Resolved, that where it is possible to raise large funds for Industrial education, this Conference recommends the placing of such funds in the hands of trustees with a view to the establishment of Technological Colleges on the most modern methods adopted in Europe, America, and Japan, for the training of large numbers of students in the various industries which are profitable in India.

Sir BHALCHANDRA KRISHNA (Bombay) : Mr. President and Gentlemen,—The resolution which is just read to you by the President is the natural outcome of the previous resolution. The previous resolution which you have now accepted with acclamation recommends that capitalists should come forward

for the purpose of founding schools for industry and commerce ; and now the resolution which I have now the honour to place before you recommends that capitalists should be appealed to in all the different provinces for the purpose of establishing technological colleges to train students for higher work. Those of you who were present here and listened to the excellent address delivered this afternoon by Mr. Holland, who illustrated his address by those diagrams in an excellent manner in regard to the metallurgical and mineral products of India, must have noticed, in his paper, one observation which must have appealed to every one, namely, that the products are there in the country. Geological surveys of India have shown you the products existing in the different provinces of Bengal, Assam, Mysore and other parts, but what is more required in this, he said, is not so much the capital as the persons to take up the question. There is paucity of persons and not of capital. He then said that it is no doubt true that capital exists in India but for all those purposes where any industries have been started in India, European capital has been appealed to. Now, the development of those industries in the countries I have mentioned to you, namely, in Europe, America and Japan, has taken place on account of the production of such circumstances. We have up to now had throughout the whole of India, Universities and Colleges for the purpose of giving training, higher educational training. All that has been a good thing. We do want higher education and training, a higher literature for the purpose of training our mind. But at the same time there has been a great want felt throughout the country of higher training, higher technical training and that want also is felt, because of the fact that we have come to know our wants. The efforts that we have been making at the several meetings of the Congress have been directed towards the same object, and you see that because of the want of men to take up different industries in different provinces, the country is becoming poorer and poorer every day. Therefore, it is absolutely necessary in the interests of the country, the interests of the development of different products, that we

should have higher training for our people and then only will people take up different smaller industries. In order that some big industry might be started, Mr. Holland said that several smaller industries should go with them, for instance, he mentioned saltpetre, nitre, which is abundantly produced, in the whole of India, or at least in some parts of India, and he said that we do not use it for our purposes. That is, the manufacture of that substance is not known to us. Our ancestors, perhaps, knew it, but we have been gradually growing indolent in all these matters, and all these industries are passing away from our hands. Let us, therefore, see the necessity of again reviving those industries. The only way of reviving them is not by simply leaving it to uneducated and untrained people but to leave it in the hands of educated, trained people, who will start the industries and see that the country benefits by the starting of such industries. To start industries, it will not do simply to import one or two men, because that plan has been tried in different provinces and has not succeeded. Nor has the plan of sending people from here to other countries for education succeeded. I know people in Bombay where men have come forward to spend Rs. 50,000 on, for instance, glass manufacture, and dyeing. What has been the result? You will be surprised to learn that those people who were sent out for training have become failures. Recently there was a gentleman who was sent by the University of Bombay and who was assisted by that most enlightened Prince, His Highness the Gaekwar of Baroda, and His Highness the Scindia, for the purpose of getting his training in glass manufacture. He went to England, attained, at least as far as the papers were able to announce, eminence in that field, but I am sorry to say that the mountain in labour has only brought forth a rat. He made a great deal of noise. He has taken service in the Gwalior State. Therefore we must be able to stand on our legs in this matter, and there is no use of sending men to England. The only way to do this is to produce our men in our country, and this can be done by starting these technological colleges. These require much capital. If we sit

with folded hands without doing anything we shall never be able to go beyond the stage of speaking. We should take practical measures. Each province must be responsible for starting a technological institution. It is in that way we can secure the regeneration of the country. I appeal to the landlords and other wealthy gentlemen to put their hands deep into their pockets and see that such colleges are established (cheers). I hear some rumours in the air that there is an idea of starting a Central University of that kind in this city of Benares. It has been known for centuries as a centre of learning. People from Madras, from the Punjab, Calcutta, Bombay, Kashmir, all received their inspiration from Benares. Let us hope that the day is not far off when the Central University will be started at Benares and the other Colleges in India will be features of that University. With these observations I commend this proposition for your consideration. (Cheers.)

Rai Saheb Lala GIRDHARI LAL (Delhi) : Gentlemen, from the bottom of my heart I wish to second this resolution. I come from Delhi, where there are twenty mills working by power, and there are so many as 5,000 persons who are daily working there. What do we suffer from ? Every day this mistry or that carpenter goes away or wants higher wages, or is enticed away by the other mills. Simply for the reason that we have not got equally efficient persons in adequate numbers to take the place of those who run away, we are obliged to give them enhanced pay and wages. That is the reason why we are suffering for want of good workmen. Good workmen can only be had when we have got good training, the giving of which depends again upon capital, because there can be no training unless you have money to support them. I am the Managing Director of a mill which employs 500 workmen in Delhi, and the difficulty felt by me and by my manager is that persons who were two years ago getting Rs. 60 a month are now employed on Rs. 120 a month, simply because they contrive to go from one mill to another. If there is a sufficient number of men equal to our requirements, we shall not

suffer by their running away from one mill to another. From the capitalist's point of view I submit it is to the benefit of the capitalists and employers of labour that they should spend their money either gratuitously or at interest by employing or by allowing persons to learn business in their mills so as to have a large number of men to help them. From a capitalist's point of view what I submit is that capitalists require honest and efficient workmen. The mill of which I have talked, the Jumna Mill, owned by four Sirdar families of Delhi, started work three and a half years ago, and as a result of the working, there has been a gain this year of Rs. 1,70,000 on a capital of Rs. 2,50,000 (cheers), or 70 per cent. profit. All this is due to earnest and honest working. No sooner are we satisfied by honest and earnest work, than we should employ our money to encourage the education of workmen. I, on behalf of the Directors of my company, beg to announce that we are ready to teach as many students as may be available, anything that can be learnt in our mill. (Cheers.) Our mill is at present only a spinning mill. We are going to add a weaving department to it soon. (Cheers.) Therefore, we will be not only glad to have men but ready to teach them. Our manager, who comes from Bombay, is a very hard-working, very honest and good worker. Mr. Tipping, that is his name, has authorised me to say that he has no objection to teaching any persons in any of the departments of industry under his control. (Cheers.)

LALA SUKHBIR SINHA (Muzaffarnagar) : The Resolution has been moved and seconded and I need not say anything more on the subject. The Resolution is important and on its carrying out rests the success of our movement. When we get sufficiently trained persons, they will be able to do everything; but if there be no Schools and Colleges, nothing can be attained, we can expect nothing. Therefore it is the duty of capitalists in India to come forward and establish these Schools and Colleges wherever they are required. The only thing that is required in India is honest workmen and trustees. No doubt, India is getting poorer and poorer; but still we have sufficient money for these things. The only thing

we require is trustworthy persons, who may undertake to do these things. There are many instances of mills which show, that for want of supervision or dishonesty on the part of workmen they have failed. Therefore capitalists have no inclination to come forward and invest their money in these concerns. It is the duty of our workmen and trustees to do work honestly and not to look as much to their own interests as to the interests of the country. With these brief remarks I beg to support this Resolution.

The Resolution was carried.

VI.

The next Resolution, which was moved by Lala Lajpat Rai, is as follows :—

Resolved, that Provincial Committees be established at Calcutta, Bombay, Madras, Allahabad, Lahore and Nagpur, for giving effect to the above recommendations, generally encouraging industries and making an industrial survey in their several provinces, and compiling useful facts and suggestions for submission to the next Industrial Conference in December 1906. In order to carry out these views each Committee is requested to raise suitable funds, appoint trustees, frame rules for the conduct of business and lay its accounts before the next Industrial Conference.

That the following gentlemen, with power to add to their number, be the members of the Committees during the year 1906 :—

CALCUTTA.

T. Palit, Esq.

The Hon'ble Mr. J. Chaudhuri.

R. N. Mukerji, Esq..

BOMBAY.

D. E. Wacha, Esq.

The Hon'ble Mr. Vithaldas Damodher Thackersey.
Lalubhai Samaldas, Esq.

MADRAS.

N. Subba Rao, Esq.

The Hon'ble Mr. L. A. Govindaraghava Iyer.
V. Krishnaswami Iyer, Esq.

ALLAHABAD.

Rai Bahadur Lala Baij Nath.

The Hon'ble Pandit Madan Mohan Malaviya.

Munshi Ganga Prasad Varma.

LAHORE.

Rai Bahadur Lala Ganga Ram, C. I. E.

Shaikh Umar Baksh.

Lala Lajpat Rai.

Lala Harkishen Lal.

Lala Mulkaraj.

NAGPUR.

G. S. Kharpade, Esq.,

Rao Bahadur R. N. Mudholkar.

M. V. Joshi, Esq.

LALA LAJPAT RAI (Lahore): Mr. President and Gentlemen,—The Resolution which has been entrusted to me speaks for itself, and many words are not needed from me to commend it for your acceptance. I am specially glad to be associated with this Resolution because I remember that it was in 1900 at the Lahore Congress that the idea of having an Industrial Conference was mooted for the first time and practically brought before the Congress, and even at that time I had the privilege of proposing that resolution by which we constituted Industrial and Educational Committees to report progress the next year. Unfortunately nothing came out of those committees. But the present Industrial Exhibition and Industrial Conference are the results of seeds sown then. I must congratulate our present President upon having inaugurated an era of industry. I think it is in the fitness of things that a patriot of his stamp, who has done solid service in the past, should have inaugurated a work of this sort. I attach the very greatest importance to the Industrial Conference and the work to be done by it. In fact, I consider it to be one of the most urgent needs of the country. I am glad

that it has been taken in right earnest ; it has a great future before it. The Resolution before you is only a formal Resolution ; but to a certain extent, it embodies the mania which the Punjabees have for constitutional and regular work. We in the Punjab do not believe in temporary and ephemeral bases, but want a permanent basis for all work to bear permanent fruit. This Resolution embodies that idea and calls upon you to form committees in different provinces to work out the programme of the Industrial Conference. We are unfortunately in the habit sometimes of basing generalisations on inexact information. This Resolution practically pledges us to supply data for our generalisations and conclusions, to enable us to proceed in the matter of the industrial re-organisation of the country. I believe that the data and information collected by the committees will be extremely useful in reviving industries which are languishing and laying down the basis for a great industrial revival. Without that information we are in the dark at present. No number of speeches will enable us to meet the situation unless we have the information before us ; facts and figures which may teach us how to proceed and will enable us to lay the foundation of a scheme really useful to the country. Of course, the carrying out of the scheme requires funds. I hope in view of the great impetus the Swadeshi movement has received, it shall not be difficult in the different provinces to collect the necessary funds to carry on the work ; because if the Swadeshi movement is to meet with the success it deserves, we must proceed on exact information, upon scientific lines. Otherwise I am afraid the outcome will not be so successful as we desire it to be. I do not want to detain you any longer. With these remarks I beg to propose the resolution for your acceptance. I hope that the members of the different committees to be formed under the Resolution will show that the work entrusted to them is actually done by them and not left to be done by others to ceme ; that the committees will actually do the work on the lines indicated and send the report to the next Industrial Conference in order to base definite conclusions thereupon.

Rai Bahadur Lala GANGA RAM, C. I. E. (Lahore) : At the last moment I think I may take this opportunity of delivering a message just 20 years old. I am afraid of so many lawyers barring it by limitation. I thought I should not put it off to another year. On my first visit to England in 1884, I was introduced to a firm of brokers. You know brokers—I speak with due deference to any gentlemen present here—are always gainers and always rich. They never lose. This firm of brokers was a very rich firm. A friend of mine introduced me to this firm. They asked me to see their godowns and I went. The head gentleman showed me some bales from Amritsar, Ludhiana and other places, and he asked me whether I knew Ludhiana and Amritsar. I saw when he opened the bale on the top a piece, the quality of which was 20; next 19, then 18, and then 17, and the quality was deteriorating as you went down. He told me, "If you have any regard for your countrymen or country, please take this message. Tell them that Englishmen are not blind. You may regard Englishmen as much savage or ignorant as you like but they are not blind. The result is, while you try to force the quality No. 12 as quality No. 20, you are only adopting a suicidal policy. The people are only giving you the price of No. 12, first taking the twelfth bale and after seeing its quality pay the price of No. 12 bale." All that I wish to draw your attention to is, that no amount of capital and no amount of industry will stimulate your movement, good as it is, unless you drive out, unless you eliminate from it, that dishonesty in the textile manufacture which is most prevalent. I think it is only peculiar to this country. My remarks apply more forcibly to the Benares work if I may be permitted to say so. In Benares work, take a piece of *kam*, a tailor is at his wit's end where to put the lowest part.

The Hon'ble Mr. L. A. GOVINDARAGHAVA IYER (Madras) : Gentlemen,—I imagine very little persuasion is necessary to commend this resolution for your acceptance. Seeing that you have passed the previous resolutions, this follows as merely a rider to that, because this resolution merely aim

at giving effect to the resolutions that have already been passed by you. You will have noticed the strong, unmistakably practical element that has characterized all the previous resolutions. All that this resolution asks is that committees be appointed in the various provinces so that they may be in a position to give effect to the resolutions already passed as far as it lies in their power. It appears to me, gentlemen, that so far as this resolution goes, it is possible not merely for the committees but also for others like school-masters and capitalists to do what lies in their power by way of giving effect not only to this but previous resolutions. This Resolution aims at making an industrial survey. I cannot help thinking that the proper body to do it is Government, because it appears to me that Government has at its disposal ample resources for the purpose of making the survey both thorough and accurate. Next to having the survey made by Government itself, the best thing will be to have it made by the people. And for making it as thorough and accurate as possible, I am sure every one of us can help these committees. I understand that power is reserved to these committees to add to them. I have no doubt, therefore, that in the exercise of that power, the committees of the various provinces will bring to their aid persons who are versed in the various industries prevalent in their provinces, so that they may be in a position to lay before the Conference next time when it meets, an account of the various industries in the various provinces which may help us to know exactly how they stand; what industries need help most and what industries are in a position to be helped and how it is we could best develop the industries and through them the material wealth of the country. We have heard Mr. Holland say with reference to his department, that he considers the best thing to do would be to take stock of how exactly matters stand. I think so far as our present industries go what we must steadily look to is an accurate and complete knowledge of their present condition. It so happens that most of these industries are being pursued by castes and families, and although they are already decayed

-or decaying, there are still evidences available to us from which we could gather what stage they are in and how best they might be rescued from their decaying condition. With these words, I beg to support the resolution and commend it to your acceptance. (Cheers).

The Resolution was carried unanimously.

VII.

The President next read to the meeting the next resolution, which is as follows :—

Resolved, that this Committee appoints Mr. R. N. Mudholkar as General Secretary, empowers the President to appoint a permanent Assistant Secretary and establishment on suitable pay, and allots a sum of Rs. 5,000 for meeting the expenses for the next twelve months.

The Hon'ble Pandit MADAN MOHAN MALAVIYA (Allahabad) : Gentlemen,—The Resolution has been read to you by the President. I am sure it will commend itself to your acceptance. The resolutions that have been previously passed require that they should be worked out. You must appoint a permanent committee. You must have a General Secretary. I cannot think of any Secretary more capable, any one more suited to the post, than my esteemed friend, Mr. R. N. Mudholkar, who has been studying the question of industrial development for many years. Funds will be needed, some three to five thousand rupees is the smallest amount that you can allot for the purpose. You will be glad to hear that the Hon'ble Munshi Madho Lal has promised to pay Rs. 2,000 ; the Hon'ble Pundit Sundar Lal, Rs. 250 ; the Hon'ble Rai Nihal Chand, Rs. 250, Rai Bahadur Lala Baij Nath, Rs. 250. I am sure many other gentlemen will be willing to subscribe towards the Rs. 5,000. The work which lies before the Committee is very important and useful. We have been talking of technical instruction ; we have been complaining to Government that it has not bestowed sufficient attention on technical instruction. We have been complaining that provision has not been made for imparting technical instruction in schools and colleges. It

has been commented by several of us that we have not yet approached Government with sufficient directness in these matters. Now that these resolutions have been passed and committees have been formed, these resolutions will be laid before the Government. The Committee's Secretary will go up to Government constantly reminding them of the necessity for technical and industrial instruction in the country. You should ask your people to do something in that direction. Time calls for action ; action from amongst yourselves. Again so far as petitions to the Government are concerned, I believe if constant agitation is kept up, if work is persistently done, a great deal of progress will be achieved in the near future. These Schools and Colleges, which it is endeavoured to see established in the country, are very badly needed. So is also a central technical institute. Our friend, Sir Bhalchandra, has told you that there is in contemplation the establishment of a Central University at Benares. (Cheers.) At this University, among other matters instruction will be imparted up to the highest degree, in a practical manner, in technical and scientific subjects with a view to promoting the development of the resources of the country and to open up new careers to the young men of our country. That matter is under consideration, and I hope it will not be long before you hear something definite about it. In the meantime you cannot, you must not wait. You require a network of schools and colleges all over the country if you can establish them, and the sooner you appoint a committee and give it sufficient funds to work up the scheme, to inform people of the needs of the provinces and give them instructions as to the directions in which they might work up and invest their energy and money, I believe a great deal of real progress will be achieved. I, therefore, commend this resolution to your acceptance.

Mr. C. VIJAYARAGHAVACHARIAR (Salem) : I second the resolution.

The following subscriptions were then announced :—

	Rs. a. p.
The Hon'ble Munshi Madho Lal, Benares	2,000 0 0
The Hon'ble Rai Bahadur Pandit Sundar Lal, Allahabad ...	250 0 0
The Hon'ble Rai Nihal Chand Bahadur, Muzaffarnagar ...	250 0 0
Rai Bahadur Lala Baij Nath, Allahabad	250 0 0
R. C. Dutt, Esq., C.I.E., Baroda	100 0 0
The Hon'ble Mr. Justice P. C. Chatterjee, C.I.E., Lahore,	100 0 0
Sir Bhalchandra Krishna, Kt., Bombay	100 0 0
N. Subbarao, Esq., Rajahmundry	100 0 0
Hakrishen Lal, Esq., Lahore	100 0 0
Lala Lajpat Rai, Lahore	100 0 0
T. Rangachari, Esq., Madras	100 0 0
R. P. Karandikar, Esq., Satara	100 0 0
K. Narayan Row, Esq., Madras	100 0 0
Rai Bahadur Lala Ganga Ram, C.I.E., Lahore... ...	100 0 0
Dewan Bahadur Ambalal S. Desai, Ahmedabad ...	50 0 0
Thakurdas Fatehchand, Esq., Karachi	50 0 0
Rai Kedar Nath, Delhi	50 0 0
Rai Saheb Lala Girdhari Lal, Delhi	50 0 0
Pandit Sundar Lal Pathak, Patiala	50 0 0
Rao Bahadur G. V. Joshi, Satara	25 0 0
G. A. Natesan, Esq., Madras	25 0 0
Pandit D. Gopala Charlu, Madras	25 0 0
Ali Mahomed Bhimji, Esq., Bombay	25 0 0
Babu Raghunandan Prasad, Bareilly	25 0 0
C. R. Tiruvenkatachari, Esq., Madras	25 0 0
Dr. H. D. Pant, Lucknow	25 0 0
Rao Saheb V. M. Mahajani, Akola	25 0 0
Vaman Ramchandra Naik, Esq., Hyderabad (Sind)	25 0 0
Himalaya Glass Works, Umballa	25 0 0
Pandit Madhao Rao Karmarkar, Benares	10 0 0
Total ...	4,260 0 0

And the following amounts were paid on the spot :—

	Rs. a. p.
Mathuradas Fatehchand, Esq., Hyderabad (Sind) ...	50 0 0
Dr. M. N. Ganguly, Cawnpore	50 0 0
Labhu Ram, Esq.	15 0 0
Ishwar Das Varshini, Esq., Aligarh	15 0 0
Babul Govilla, Esq., Aligarh	15 0 0
Roshan Lal, Esq., Lahore	10 0 0
Lala Madan Mohan Sinha, Ghazipur... ...	10 0 0
Raghavachari, Esq.	10 0 0
Small sums	27 0 0
Total ...	182 0 0
Grand total ...	4,412 0 0

The Resolution was then put to the meeting and carried.

The PRESIDENT.—I am very glad to announce that the money subscribed is very handsome. As it is getting late, any gentleman who wishes to subscribe, will do so to Mr. Mudholkar. Before dispersing, I, on behalf of the Industrial Conference, beg to express our great obligation to the Exhibition Committee and to the Hon'ble Munshi Madholal, who has been the life and soul of the Exhibition (cheers). Although the time taken up by the Congress has been so long and protracted and the time given to us has been so short, yet with your patience, your forbearance and your active co-operation, we have been able to go through the programme of the day. I sincerely thank you, the delegates present here, for the help and assistance rendered us, in going through the business of the day. I know we have laid the foundation of some solid work. I know there is a great deal of feeling, of real, earnest and true feeling, in all the provinces of India, to turn our hands, to some extent, to manual industry and commercial enterprise. It was necessary, therefore, to give some shape, some concrete form, to that principal sentiment. I believe the work which has been achieved to-day will give some form and some reality to that endeavour. Gentlemen, we have tried our best to select men in all parts of India to co-operate with us in this movement. Committees have been formed with three or more gentlemen in every province to go on with operations in their respective provinces, and these committees are empowered to add to their number as the work goes on increasing. The principal management has been left in the hands of Mr. Mudholkar. A better selection could not have been made. (*Cheers.*) He will be the Secretary of the Industrial Conference and he will carry on correspondence with the local committees of all the provinces and he will have an Assistant Secretary whom the Chairman has been authorised to appoint. Gentlemen, I will not forget to mention the name of one individual to whom the success of our Industrial Conference is not a little due, and that is Mr.

Chintamani. (Cheers.) The idea was partly his, but after the idea was formed, he has been indefatigable in his exertions to make it a success. He has moved the leaders of public opinion in India and also the high officials of the Government and retired English gentlemen, men who have retired from this country, to sympathise and co-operate with us and the success that we have achieved to-day is not a little due to his exertions and to his endeavours. Before we part to-day we offer our hearty thanks to all the gentlemen who helped us in this meeting. Once more we give our thanks to all the distinguished visitors who have come here and graced this meeting with their presence, to the Exhibition Committee and to the Hon'ble Munshi Madho Lal. (Cheers.)

Mr. ALI MAHOMED BHIMJI (Bombay): I propose a hearty vote of thanks to the lover of our country. Our deliberations have been presided over by such a worthy son of our soil as Mr R. C. Dutt. (Cheers.) Our hearty thanks are due to him because if it had not been for his work we would not have had such a successful gathering. He has rendered most invaluable services to the country and is still rendering similar services in the Native State of Baroda. He is going to improve it to such an extent that I foresee there something of a glimmer of a native Parliament coming into existence. For all these exertions and services of his we simply record a hearty vote of thanks which I hope you will carry with acclamation. (Loud Cheers.)

The vote was carried with acclamation.

The PRESIDENT: Gentlemen,—I am exceedingly obliged and thankful to you for the kind way in which this vote of thanks has been proposed and the enthusiastic manner in which it has been carried. We shall carry away with us from Benares many pleasant recollections of your hospitality and co-operation in the work we had to perform. That we have performed the work so well and so far, is due to your co-operation. (Cheers.)

The First Indian Industrial Conference was then dissolved.



APPENDIX I.

IMPROVEMENTS IN NATIVE METHODS OF SUGAR MANUFACTURE.*

By S. M. HADI, Esq., M.R.A.C., M.R.A.S.,

Assistant Director of Land Records and Agriculture, United Provinces.

I.—SUMMARY OF THE PROGRESS OF THE INVESTIGATION.

When these investigations were decided on, the Director of Land Records and Agriculture suggested certain possible improvements, among them the use of a square evaporating pan and the introduction of the centrifugal machine.

There was an old square pan in the stock of the department known as the American evaporator, which had never proved a success in our trials, nor had it been adopted by any native manufacturer. This evaporator was chosen as the groundwork for experiment, and improvements were made from time to time and demonstrated in the more important sugar manufacturing centres of Rohilkund, free criticism being invited and indulged in. As a result of these discussions, experiments and demonstrations, a suitable system of pans substantially different from the original arrangement was elaborated, and when exhibited at work at Bareilly and Rampur in the past season received general approbation from native experts there.

With regard to the use of the centrifugal machine, it may be observed that we have in our stock several such machines of different sizes which had already been tested by my predecessors and myself. These machines were tried again systematically and exhaustively with different samples of *rab*. It was found that there were two great defects in these machines, *viz* :—

(1) That their speed was not sufficiently high and consequently the molasses could not be completely separated, especially when the *rab* was sticky, which is by no means an exceptional feature of the *bel rub*; and (2) that the perforations in the wire-gauze were a little too large to prevent the finer crystals from passing out with the molasses and the machines were consequently not suitable for Indian *rab*, the loss of the crystals in machining the *rab* being excessive. Further, the sugar (*potli*) obtained was usually moist and yellow in colour. It was therefore an article for which there is practically no market in India except for the purposes of refining. The cost of centrifugalling was so high that I found it would be no achievement to introduce in the native industry hand-power centrifugal machines

* Appendix to Mr. Hadi's paper on the subject. See text.

of this type merely for producing *potli*, a stuff which must be treated with *siwar* at a high cost before being fit for sale. For these reasons the machines in stock were given up.

I then explained my requirements fully to a well-known English firm of manufacturers of sugar machinery, viz., Messrs. Broadbent and Sons of Huddersfield, and they constructed to my order a centrifugal hydro-extractor which was free from these defects, and which answered my purposes admirably. When this machine was first used, a high percentage of outturn of sugar was obtained and the molasses were completely separated, but the colour of the crystals remained yellow, and therefore the produce was still unsatisfactory. It was thus obvious that to make the centrifugal a success some cheap method of decolorising the produce was essential. Bone-black was of course out of the question, and a large number of substitutes were tried without success. This difficulty continued to give trouble for months, but in course of the experiments I learned that by boiling fresh cane juice as rapidly as possible in copper vessels instead of in iron pans, and with certain vegetable defecants to be used in a particular manner, I could produce a yellow *rab* which, when passed through the centrifugal, yielded a very high percentage of sugar, very much lighter in colour than that obtained with the centrifugal from ordinary *rab*, or from the *rab* that I had been making in my iron evaporator. The use of milk of lime which has often been recommended was found absolutely fatal to the quality of the sugar, and was entirely abandoned after exhaustive trials.

Success was, however, not yet complete. The sugar thus obtained was distinctly inferior to the country *khand* in colour, though superior to it in other respects, and it could not therefore be passed as *khand*. To remove this light shade of yellow was a very vexing question. The colour was slightly reduced by steaming the sugar in the centrifugal while it was in motion, but this process reduced the quantity of outturn to a certain extent, and was rather difficult for the native refiners to follow, besides being too expensive for a small factory. I therefore gave it up, and instead of steaming the sugar, I washed it with different agents and found at last that a decoction or distillate of the rind of *riha* fruit (*Sapindus Mukorossi* or soap nut) was most useful for washing the crystals, when a suitable alkali had been added to the *rab* before putting it into the centrifugal. The alkali which answered this purpose best was bicarbonate of soda, the normal carbonate having failed to produce the desired effect.

By adopting this treatment the sugar obtained was as white as ordinary *khand*. The tedious process of treating the sugar with *siwar* was in this way dispensed with.

A system of refining deep coloured sugars obtained from ordinary *rab* and *gur* so as to produce *chini* and *qand*, the forms of refined sugar most favoured by native consumers, was then devised and experimented on. It promises success, but the experiments are not yet complete, and will probably form the subject of a separate discussion in future. The object of this pamphlet is to publish for general information a brief account of the methods elaborated and the results obtained in our experiments so far as the manufacture of *khand* is concerned.

It must be remembered that this publication is intended chiefly for the benefit of the native refiner who is ignorant of the principles of sugar manufacture followed in other parts of the world, and does not presume to instruct or enlighten scientific manufacturers. Finally it must be observed that sugar-making by this or any other process is an art which cannot be learnt thoroughly from books. While this pamphlet will serve as a general guide to the manager of a factory, it will not teach him how to produce the best sugar : the details of the different processes require a trained eye. It would therefore pay any one who wishes to adopt these methods to learn them practically from me or from the trained officials of the Agricultural Department. No tuition fees are charged.

II.—THE CANE CROP.

The crop should be mature at the time of cutting. If it is unripe the sugar will be poor in quality and the outturn low.

The best results can only be obtained from healthy canes. Plants attacked by borers at the top are not unfit for use in the factory, but crops attacked with *kari* or *lewahi* are practically useless, and should not be dealt with.

The plants should be cut as close to the ground as possible. The tops should be cut off and set apart for planting, as is the custom in Rohilkhand and the western districts. This custom might well be adopted in Oudh and the eastern districts, where it is usual at present to cut up the whole cane for planting. The juice in the tops is usually more acid and less rich in sugar than in the rest of the cane, and its presence in the boiling pan favours inversion. For this reason specially it is advisable not to use tops for crushing. The tops are as good for seed as any other part of the cane. In Rohilkhand tops are not removed from *red* canes ; there seems to be no sufficient reason for the exception, for in Meerut tops are cut off in the case of red canes as well as in case of other canes. When red canes have flowered the tops lose much of their sugar and must be cut off in any case. Whether they will be fit for planting is a question for future determination, but they must not be crushed for juice.

The canes should be crushed as quickly as possible after they have been cut, and should not be allowed to lie over under any circumstances for more than 24 hours, or else the yield of crystallised sugar will be low. Canes should be tied up in bundles of about one maund each before going to the crushing mill. The roots at the bottom should be washed with water by the *bhishti* before the bundle goes to the mill, so as to remove the particles of earth which usually stick to the lower portion of the cane, and which give an unsightly colour to the juice. A mat should be spread near each mill and the bundle of canes should be placed on the mat in order to avoid picking up fresh dirt. This measure will save much trouble in the subsequent process of straining and forms the first step towards obtaining a high class of raw sugar. As crushing usually begins about 3 or 4 o'clock in the morning it is desirable to cut the crop in the previous afternoon, strip the plants at once and store the cane at night.

III.—EXTRACTION OF THE JUICE.

The mills in general use in Rohilkhand are the common two-roller iron mills which extract only about 45 to 55 per cent. of juice from the cane, whereas the more efficient three- and four-roller mills have been found in actual trials to express from 55 to 65 per cent. of juice from the same cane. The loss of so much juice may not affect the *khandeari* if he is able to buy enough to keep his factory going throughout the season, but it is a serious matter for the cultivator as it reduces the price he receives for his crop by something like one-sixth. It is not the cultivator's fault, for he hires the best mill he can get; but the mills are supplied mostly by small capitalists who are not over scrupulous as to the condition of the mills they issue, and the cultivator is at their mercy. The use of three- and four-roller mills has been objected to on the ground that the mills besides being more expensive, will be too heavy for the ordinary cattle of Rohilkhand, but in course of numerous trials that I made I found no evidence of their incapacity to work the better mills. It will undoubtedly be to the mutual advantage of the landlord and his tenants if the former keeps a stock of superior mills and lets them out at a fair rent proportionate to the amount of juice they extract.

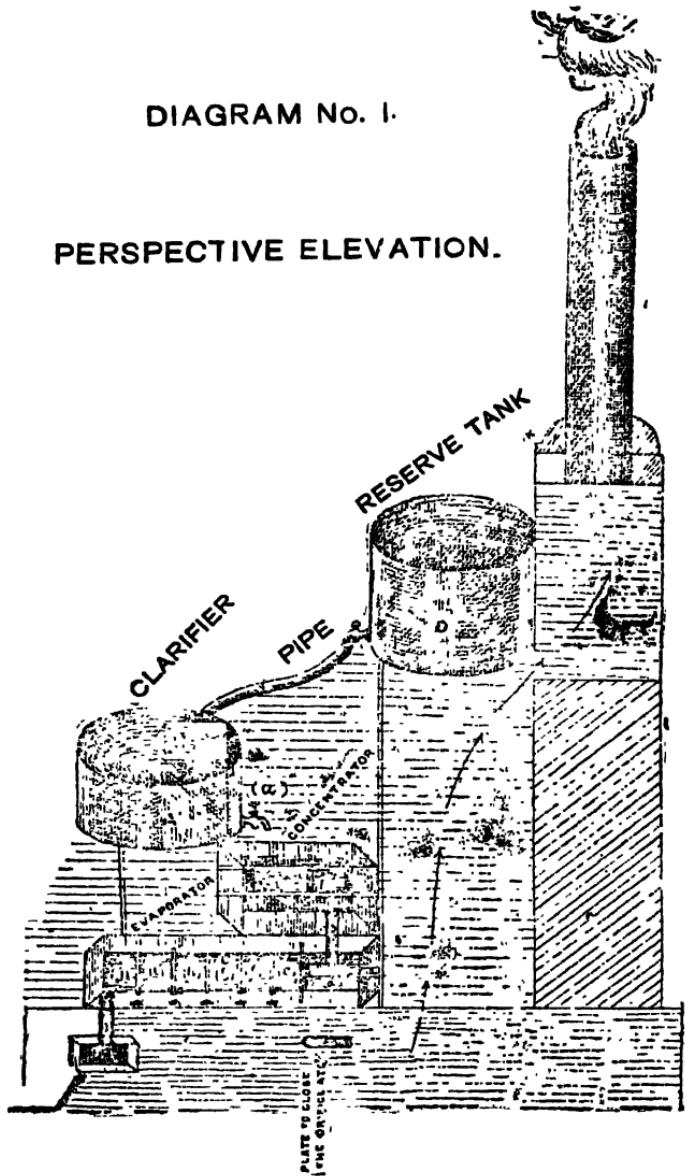
The ordinary practice of using large earthen vessels permanently sunk in the ground for receiving the expressed juice is highly objectionable. As a rule, the juice is not taken out from these receivers until several maunds of it have accumulated in the vessel, and the latter can never be kept quite clean. The kerosine oil tins now available everywhere in India answer remarkably well as receivers. These tins hold about 20 or 21 seers of juice. The time occupied in extracting this quantity is so short that there can be practically no undesirable chemical changes in the juice within that time. Immediately the tin is full it should be emptied into the clarifier or reserve tank of the boiling plant where the juice gets quickly heated and the chances of inversion are minimised. A handle should be attached permanently to the top of each tin by means of iron nails. A tin should be placed below the spout of each mill in a hole sufficiently wide to admit of free handling of the tin for putting it in when empty and taking it out when full.

A square or oblong strainer consisting of a wooden framework with a bottom made of perforated sheet iron should be placed on each tin. This will catch the smallest bits of cane that flow out from the mill with the juice, and the juice which accumulates in the tin will be pure in consequence. There are strong grounds for believing that the presence of small pieces of cane in the juice for even a short period results in considerable loss of sugar. The tins should be washed frequently during the working day and so should be the mills and the strainers. A little sulphur might be burnt, and the tin, after it has been washed, held over the smoke by the hand with its mouth downwards. The use of sulphur fumes in this manner is useful for scientific reasons, but it is not essential.

It is desirable for the sake of convenience to have two tins for each mill so that a perfectly clean one may be readily available for use when the other has been carried to the boiling yard.

DIAGRAM No. I.

PERSPECTIVE ELEVATION.



The refuse should be removed from the mill at regular intervals and dried in the sun, any refuse sticking to the rollers being separated with an iron nail.

Crushing should be started about 3 or 4 o'clock in the morning so that boiling may commence about sunrise.

It is a good thing to stop the boiling soon after sunset and give the staff ample time to take their meals and enjoy a refreshing sleep before taking up work the next day.

IV.—THE BOILING PLANT.

The boiling plant which has been devised specially for the purpose of producing high class *rab* consists of four pans, *viz.* (1) the clarifier, (2) the concentrator, (3) the evaporator, and (4) the reserve tank. The arrangement of the pans is shown in diagram No. 1. The following dimensions of the various pans are suitable for a factory working up about 8,000 maunds of juice in a season.

The Clarifier.—This is a round vessel 3' 10" in diameter and about 1' 4" deep. It is capable of holding a charge of from 10 to 12 maunds of juice at a time.

A tap (*a*) is fixed in this pan, by opening which the clarified juice is let into the concentrator.

B. The Concentrator.—This is an oblong pan 5' long, 3' 3" broad and 10" deep. In this the clarified juice is allowed to boil before being run into the evaporator through the tap (*b*).

C. The Evaporator.—This is also an oblong vessel 8' 9" long, 3' 3" broad and 7" deep. It is divided into seven compartments (*d*), (*e*), (*f*), (*g*), (*h*), (*i*), and (*j*), by means of partition walls. The first compartment (*d*) is 3' 3" (*i.e.* the width of the evaporator) long, 2' 8" broad and 7" (the depth of the evaporator) deep. Into this compartment the juice flows from the concentrator when the tap of the latter is opened. The remaining six compartments are each 3' 3" long by 1' wide by 5" deep, the partition wall between the first compartment (*d*) and the second compartment (*e*) being 7" high. At the point *d'* in the wall of the first compartment there is an opening which can be closed by means of a plate moving freely in a slit made in the wall. The flow of juice from (*d*) to (*e*) is regulated by this plate. Should there be any leakage it is stopped by putting a piece of rag at the bottom of the opening and pressing it down with the plate. The other compartments are constructed together by openings in the partition walls, closed with wooden shutters operated by handles outside the pan. The flow of juice is regulated by these shutters so that the desired quantity can be admitted to, or retained in, each compartment. As will be seen from the diagram the shutters are placed alternately at the ends of the partitions. In the last compartment (*j*) a pipe *j'* is soldered permanently to a hole in the wall of the compartment.

It is through this pipe that the juice when it has been completely boiled, or, in other words, when it has acquired the consistency of *rab*, is let out into the receptacle placed below, the mouth of the pipe being opened, when required, by removing a wooden plug fitted into it.

D. The Reserve Tank.—This is a round pan having a diameter of 3' 9" and a depth of 1' 10". It is used for storing juice which comes in from the mills when the clarifier is already fully charged with juice which is undergoing the process of defecation and clarification. It stands higher than the clarifier, and as soon as the latter is empty, juice is admitted from the reserve tank through a pipe *k* which connects the two pans, the diameter of the pipe being about 1".

The reserve tank and the pipe attached to it may be made of iron or galvanized iron (preferably the latter) instead of copper. The rest of the pans *must* be made of copper sheet. On each of these pans is placed a filter or strainer as shown in the diagram.

V.—THE FURNACE.

The most appropriate furnace for the system of pans just described is an underground excavation. It consists of two chambers marked *a a'* (diagram II) separated for the greater part of their length by a partition wall marked *P. W.*, which is a portion of the natural ground left in position while digging the furnace. Each of the two chambers is 8' 9" long by 2' wide at the bottom and about 2½' wide at the top. Chamber *a* is under the evaporator, while chamber *a'* is under the clarifier and concentrator.

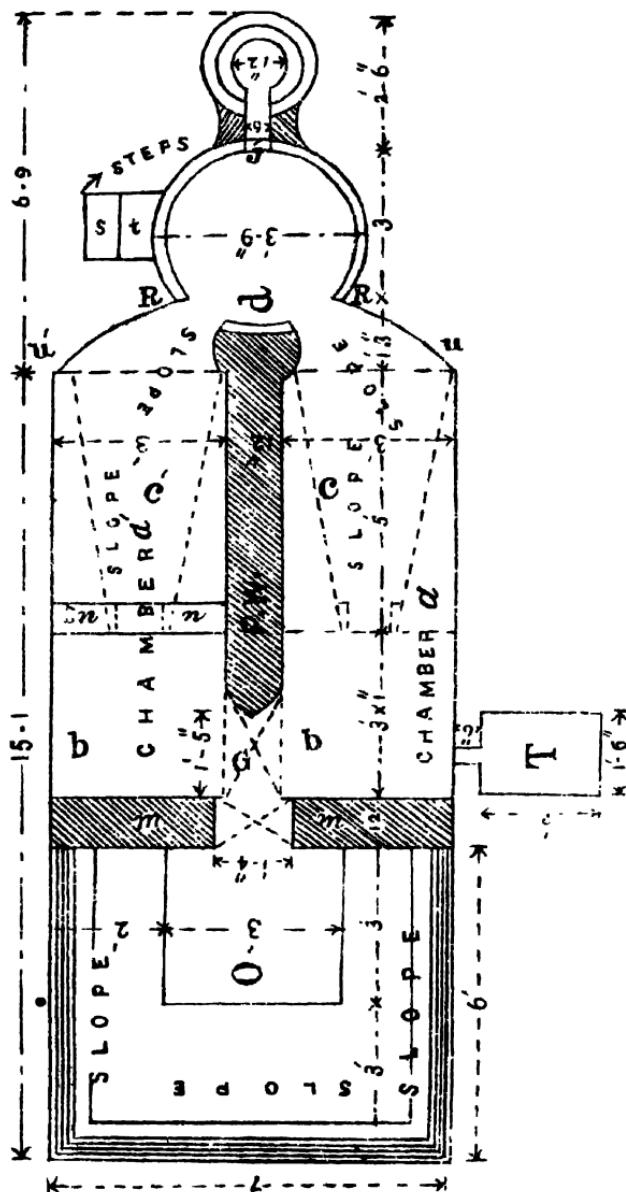
The front portions of these chambers (marked *b b'*) have a uniform depth of 3'. In the back portions (marked *c c'*) the floor is at first 1½' below ground level, and slopes gradually upwards to the points *u u'*, which are about six inches below ground-level. The varying depths in different parts of the furnace can be seen in diagram III.

The front of the furnace is formed by a wall *m*, having two openings *e* and *p* visible in diagram III. The upper opening *p*, 7" in diameter, is for feeding the furnace; the lower opening *e* is an arch 15" high and is used for removing ashes. In front of these openings is an excavation *O* where the fireman works. The fire is lit at *G*, where the two chambers are joined by an arch, and the heat is carried to the back of both chambers of the furnace by the strong draught which this arrangement produces.

The four walls of part *b'* of the left chamber, over which is placed the clarifier, are 1' 10" high above the ground surface, while those of part *c*, of the same chamber on which the concentrator is placed are 10" high above the ground, so that the clarifier is about one foot higher than the concentrator. The wall *n n*, shown in diagram II, stands on two iron bars *h h*, (shown in diagram III) placed across the chamber *a'*, 10 inches above ground level, and is 1' high and 6" thick (see line *f f'*, diagram III). The chambers *a a'* begin to curve inwards from points *u u'* (diagram II), and the two curves open into the circular oven *d* (diagram II), over which the reserve tank is fixed. The currents of heat produced at *G* when they have passed through chambers *a* and *a'* meet together in the oven *d* and heat the reserve tank.

The circular oven *d* is 3' 9" in diameter and 3' high from the ground level which forms its bottom, no excavation being necessary

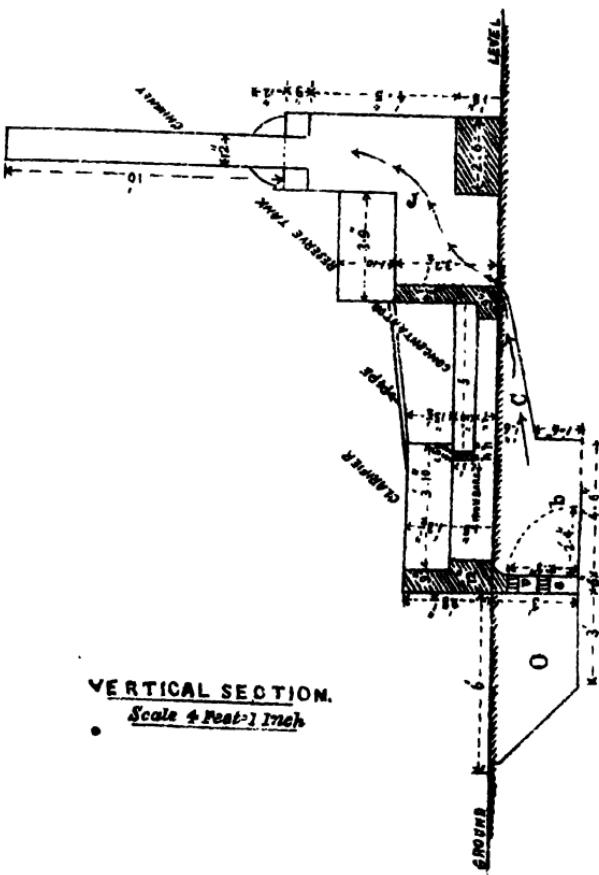
DIAGRAM No II.



GROUND PLAN

Scale 4 Feet-1 Inch.

DIAGRAM NO III



here. The wall of this oven is 9" thick all round. Outside this oven there are two steps *s*, *t* (diagram II), to enable the labourers to reach the reserve tank. The semi-circular space *w' R' R-u* (diagram II) between the chambers *a* and *a'* and the oven *d* is roofed with iron bars placed on the ground (section shown in diagram III), and covered over with earth.

Smoke passes out into the chimney through the outlet *I* (diagrams II and III) made in the wall of the oven *d* 1' 8" above the ground.

The height of the chimney should be 10' and its diameter 1'. The base of the platform over which the chimney is fixed is 2 feet 6 inches wide (see diagram III). Below the spout of the evaporator at the outside corner of the right hand chamber *a* there is a pit, *T* (diagram II), to hold the receivers for collecting the *rab* coming out of the spout.

There is a slit in the front wall, *m*, into which a sliding iron plate may be inserted in order to close completely or partially the arch *G* when it is necessary to reduce or stop the supply of heat to the chamber *a* over which the evaporator is placed.

The furnace is the outcome of long investigation. The different pans require different amounts of heat at the same time for their successful working, the clarifier and the last two compartments of the evaporator usually requiring the largest amount. With the arrangements of chambers explained above each pan receives a constant supply of the requisite amount of heat, although the furnace is fed only at one place, usually with the dry mill refuse ("begass" *pata* or *kholi*), the use of firewood being almost entirely dispensed with. The fireman supplies only about a quarter of a pound of the dry refuse at a time, but he has no time to rest. His work must continue without any break, except perhaps when the clarifier is being supplied with a fresh supply of juice. The continuous feeding with small quantities of refuse is found by experience to give sufficient heat to deal with as much juice as the plant can hold.

The shape and dimensions of the various chambers and their different parts noted above have been carefully worked out, and in digging his furnace the manufacturer must see that the figures are closely adhered to, otherwise the distribution of heat in the furnace might be irregular and the boiling process unsuccessful.

VI.—BOILING THE JUICE.

The aim of every manufacturer should be to produce that quality of *rab* from which a high percentage of perfectly white sugar (*khānd*) can be made with a centrifugal machine without decolorizing the crystals with *sivar*. This is a very difficult matter and the object cannot be achieved with the plant described above, unless the following instructions are literally carried out. The clarifier and the rest of the boiling plant, except the reserve tank (which may be made of iron), must be made of copper. Iron always imparts a greyish tinge to the crystals, which cannot be completely removed by washing or steaming the sugar while in the centrifugal. When the copper plant is new the *rab* boiled therein yields more or less pink sugar, but if the boiling vessels are rubbed regularly with stones and washed, and

the inner surface of the vessels is wiped with a piece of rag dipped in water slightly acidified with sulphuric acid, the *rab* made after the plant has been in use for three or four days ceases to yield pink sugar, the colour of the crystals then obtained being white.

The juice must be boiled as fresh as possible. As soon as the tin at each mill is full it should be brought to the factory and emptied into the clarifier, care being taken to strain the juice through the blanket strainer placed over the clarifier. As soon as the charge is complete, *i.e.*, when about 20 tinsfuls of juice have gone into the clarifier, the fire underneath should be lit and the juice heated.

While the mills are starting work the defecants to be used should be prepared at the factory so that they may be ready as soon as the first charge of juice is received. About one pound of *pink sajji* should be boiled in a tinsful of water, and then cooled and strained. This solution should be kept on the right hand side of the sugar boiler; about one pound of *deula* stalks (wild hibiscus) should be washed, pounded, and immersed in a tinsful of *clean* water. The stuff should next be well rubbed between the hands till the liquid inside the vessel acquires a thick mucilaginous consistency. This may be strained into another tin and a fresh supply of water poured into the first tin, in which the material should be rubbed again to yield more mucilage. This process should be continued till all the mucilage that the *deula* is capable of yielding has been squeezed out. *Deula* is the best defecant known in this country and answers particularly well in our process. If wild hibiscus be not available, cultivated hibiscus (*bhindi, hibiscus esculentus*) will do equally well.

Falsa, which is commonly used in Rohilkhand, *must not* be used. It imparts a peculiar colour to the crystals which cannot be got rid of.

When the clarifier is charged with juice for the first time the other vessels of the boiling plant should be filled partially with water, or else they will be damaged by the fire.

When the fire has been lit scum will soon begin to accumulate on the surface of the juice in the clarifier. The rising scum must *under no circumstances* be disturbed with the skinner (a slightly hollow circular disc of copper sheet to which a handle is fixed) until the scum has begun to "crack." At this stage about half a tinsful of the *deula* water should be introduced into the clarifier and the scum should then be removed as quickly as possible and thrown on the filter kept on the right hand side of the boiler. A tinsful or half a tinsful (or less—just enough to stop the ebullition) of clean water should then be added to the liquor and a second dose of *deula* water should then be poured in and the scum taken off as it comes to the surface. The third dose of *deula* water (which is usually the last) should then be added to the liquor and skimming continued. About half a pint of *sajji* water must be added with the third instalment of *deula*. This is usually the practice in Shahjahanpur, but Bareilly experts use *sajji* water *without* the admixture of *deula*, and in our own experience it has been found to be preferable to avoid the addition of *deula* to *sajji* water. If absolute transparency in the liquor is not obtained after adding *sajji* water and skimming, an allowance of cold water must be added and the liquor boiled again with gradual additions of *sajji*.

water, (any scum rising to the surface being carefully taken off) till the liquor is quite bright.

There is no limit for the amount either of *deula* or *sajji* water. These agents must be used till the liquor is perfectly transparent and brilliant. If on examination it is found that the liquor is hazy, more *sajji* water should be added in conjunction with *deula*. Any foam that comes up at this stage on the surface of the juice should be *perfectly white*. If this is so, one may expect that if the boiling is properly carried out the resulting sugar will be of a superior white colour.

It will sometimes be found that in spite of the treatment of the juice above described the liquor is full of minute particles floating about in it. This is an indication of the fact that the juice has not been fully clarified, owing to careless manipulation. If the liquor be boiled down in this condition the floating particles will appear in the concentrator as they will pass out through the blanket filter provided over that pan. The precipitate if boiled down with the liquor will affect the quality of the resulting sugar, specially with regard to the colour. It is therefore important to avoid the formation of these particles, and, if they are found, to get rid of them. A simple way of securing this end is to add three or four tinsfuls of fresh raw juice to the liquor and start clarification with *deula* and *sajji* water afresh, as if the whole contents of the clarifier were a new charge. If the instructions already given are then faithfully carried out, a brilliant liquor will soon be obtained.

If pink *sajji* be not available dark *sajji* may be used instead ; it is cheaper and less active. Bicarbonate of soda may be substituted for *sajji* when the latter cannot be obtained ; but great care is necessary in using bicarbonate as the scum rises with considerable violence as soon as a lump of soda is thrown into the boiling liquor, and if the skimming is not done quickly the liquor may overflow. About three to four drams (one *tola* to 16 *mashas*) of soda is enough to clarify about 10 to 12 maunds of juice : if more is used there is the risk of the colour of the sugar being affected. If the juice is poor in quality or has been obtained from stale cane it is desirable to use about three pints of lime water (*not milk or cream of lime*) along with *sajji* water after the liquor has been rendered transparent. The allowance of lime water should be added gradually and not all at once, continuing so long as the liquor does not show any haziness or floating particles, but as soon as such particles begin to appear lining should be stopped or else the colour of the sugar will be injured.

In clarifying by methods described above, the juice when it has been fully clarified is distinctly acid. No effort must be made to neutralize the acidity completely by any of the alkalies mentioned above, otherwise the resulting sugar will not be white.

It should be borne in mind that nothing pays so well as rapidity of boiling, and no time should therefore be lost at any stage in the process of clarification. As soon as the juice in the clarifier has acquired the desired degree of brilliancy the tap should be opened and the liquor allowed to flow into the concentrator. In doing so the juice runs through a double blanket filter placed over the concentra-

tor. Before running the juice into this pan the boiling water in the pan must, of course, be drained out and the clarifier should be promptly refilled with a fresh charge of juice drawn from the supply accumulated in the reserve tank. The liquor in the concentrator should be skimmed as long as skimming is found to be necessary. There is hardly any scum, but white foam appears on the surface of the liquor, and it is desirable to remove this on to the filter provided for elimination of liquor from the skinning. (The liquor so eliminated should be put back into the clarifier at intervals.) While the second charge is being dealt with in the clarifier the liquor in the concentrator is allowed to flow into the first or largest compartment of the evaporator. The sluice gate provided in this compartment should remain closed while the juice is coming in. The boiling water already in the various compartments of the evaporator should be expelled and then the juice should be run into the second compartment, and on to the third compartment, and so on till it reaches the last compartment. An even distribution of liquor among various compartments is essentially necessary, and it is also important always to keep a sufficient supply of liquor in each compartment and no more, or else it might overflow.

Care should be taken to prevent the liquor getting overheated in any of the compartments. This is sure to occur if there is a deficiency in the supply of the liquor to any compartment; and it is chiefly in order to regulate the supply of liquor in each compartment that shutters have been provided in each partition wall in the evaporator. When the liquor has been overheated, part of the sugar is converted into caramel, a substance which injures the colour of the *rab* so seriously that the *khand* obtained with it in the ordinary course is always of a poor quality. A little skimming will be found to be occasionally necessary when the liquor is travelling through the various compartments and it will pay the manufacturer to have it done in order to obtain the best quality of *rab*. The *pharni*, which consists of a semi-circular wooden disc to which a handle is attached, is a very useful implement for transferring the liquid from one compartment to the other, but it must be used with great caution in the last compartment, in which the liquid acquires the consistency of *rab*, and when the liquid has nearly acquired that consistency the *pharui* should not be used in the last compartment ; if it is used for stirring or agitating the boiling mass the crystals will be injured.

The most critical stage of the boiling process occurs when the liquor is thickening into *rab* in the last compartment. If bubbles appear in large numbers and ebullition is violent, a few drops of castor oil mixed with *sajji* water or a little *ghi* may be thrown into the boiling mass, and the liquid will subside at once. The heat has to be regulated with much care to prevent conversion of part of the sugar into caramel, and the fireman must obey the orders of the boiler.

There is no rule of thumb for determining the point when the boiling may be regarded as complete and no satisfactory test can be used by ordinary boilers. If the *rab* has not been boiled enough the percentage of crystals in it will be low, while if it is overboiled the colour of the sugar will be defective. The boiler's art lies in

producing *rab* which is open to neither of these objections. Boiling must not therefore be entrusted to ignorant or careless men.

The outlet in the last compartment should be opened *as soon as* the boiling liquor has sufficiently thickened, and the *rab* allowed to drain into the earthen receiver (*nand*) placed underneath, the shutter of the next previous compartment being opened at the same time to let in a fresh supply of boiling liquor to take the place of the *rab* that has gone into the *nand*.

Rapidity of boiling is an important factor of success in the manufacture of *rab* and the heat should therefore be so regulated as to obtain the largest amount of *rab* in the shortest space of time without injuring the quality. If the liquor is boiled with undue slackness, the colour is affected injuriously, and it must not be allowed to stay in any compartment longer than is absolutely necessary.

As soon as about 20 or 30 sers of *rab* have accumulated in the earthen receiver it should be removed from its place, and another *nand* placed instead to receive the *rab* that will come in next. The *rab* in the first receiver should *immediately* be subjected to the process of *osana*, or airing.

This is done by holding a *karanga* (ladle) in the right hand dipping it into the hot *rab*, giving it a turn in the mass, lifting the *karanga* filled with *rab* up the brim and pouring the *rab* back into the *nand* from a height of about two feet so that the *rab* may be aired during its passage from the *karanga* back into the *nand*. This operation should be repeated over and over again with due rapidity till the *rab* has been aired to the desirable extent and can be touched with the fingers without scalding them. The determination of the point at which airing may be regarded as complete is also a matter of experience.

If the *rab* has not been fully aired, the crystallization will be imperfect and slow. If the airing has been overdone, the crystals will be small in size. The airing having been finished, the *rab* should be potted as quickly as possible. The vessel commonly used in Rohilkhand for this purpose is the *kalsi*, which is similar to the common *ghara* but larger in size, capable of holding about 25 to 30 seers of *rab*. The use of *kalsis* is open to several objections but at present we assume that a better vessel is not available in the country at a reasonable cost and *kalsis* must therefore be employed for potting the *rab*.

The aired *rab* should be transferred from the *nand* by means of a *karanga* into a well-baked *kalsi* specially chosen for the purpose and from the latter it should be poured into *kalsis*. As soon as each *kalsi* is full, it should be covered over with an earthen cup and the *rab* left to cool and crystallise. *Kalsis* should never be filled quite up to the top or else the *rab* will overflow on cooling.

If the juice was of good quality and the boiling was performed properly, a thin crust of crystals will soon appear on the surface of the *rab* within the *kalsi*. If a bloom appears in place of crust on the surface of the *kalsi*, it is also a good sign, showing that the consistency is not too thick. If a sticky pale scumlike substance (techni-

cally known as *gabhoi*) makes its appearance on the upper surface it is an indication of the fact that the juice contained an unusually high percentage of uncrystallizable sugar, and in this case the *rab* obtained is as a rule poor in quality.

The *kalsi* should not be removed to any considerable distance while hot, otherwise the natural process of crystallization will be interfered with.

If during the process of airing it is found that the *rab* has been accidentally boiled too thick, the *nand* should be placed at once below the spout provided in the last compartment of the evaporator and some *rab* of thin consistency should be run into the *nand*. Similarly if the *rab* in the *nand* is found to be too thin, some extra thick *rab* should be made and let into the *nand* to correct the consistency.

The *rab* when potted should be allowed to rest for at least ten days before it is used for making *khand*. During this period of rest the crystallization is completed, the grains become firm, and the molasses naturally separate from the crystal in the jars. If a jar is then broken, the greater part of the molasses will be found to have accumulated either at the top or in the middle of the jar.

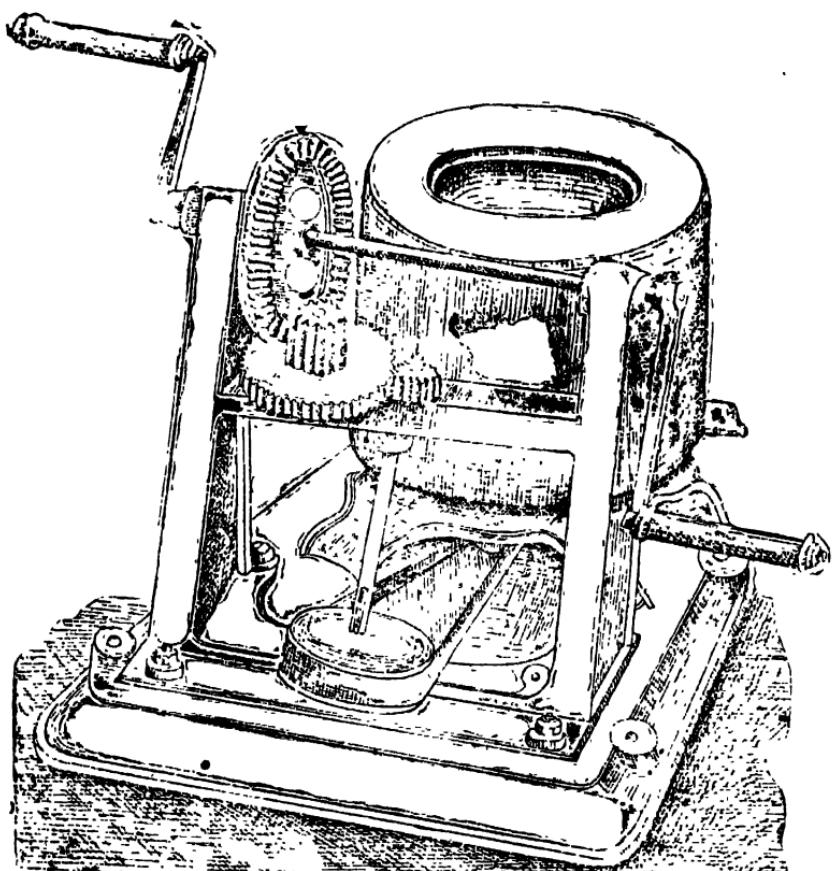
From the foregoing account it will be seen that the man in charge of the boiling plant must learn by experience—

- (a) how much of the clarifiers to use and when;
- (b) at what point to stop boiling;
- (c) how long to continue airing; and
- (d) how to regulate the firing.

VII.—SEPARATING THE SUGAR.

The separation of molasses from crystals can best be effected by means of a centrifugal hydro-extractor. Messrs. Thomas Broadbent and Sons of Huddersfield, England, have manufactured a hand-power machine to our order which serves this purpose remarkably well. The cost of Broadbent's machine in England is £25, or about Rs. 375. The freight from England and other charges of import amount to about Rs. 40. The machine consists of a cast-iron frame on the base of which is mounted a circular case made of mild steel. Inside the case there is a round cage of perforated copper, which is made to revolve at a very high speed by means of a leather belt and an arrangement of bevelled wheels attached to an axle which is turned by hand-power. The machine is said to run at a speed of about 2,700 revolutions per minute when the labourers turn the handles at 60 revolutions per minute; the high speed appears to be an important factor in dealing with *rab*. The machine should either be fixed firmly on a masonry platform, or wooden sleepers may first be sunk into the ground and the machine fixed to the sleepers by means of bolts and nuts. A hole should be dug under the spout of the machine to contain the molasses receiver, usually an ordinary kerosine tin. The various parts of the machine should be properly oiled (castor oil being best for this purpose). The keys which fasten the various cogwheels to their respective axles should be carefully tightened by a hammer.

DIAGRAM NO. IV.



BROADBENT AND SONS
HAND POWER CENTRIFUGAL
HYDRO-EXTRACTOR 18 DIAMETER



The leather belt which runs the machine should be made perfectly tight ; there is an arrangement in the machine whereby the position of the belt can be regulated. The cage of copper mesh should be thoroughly washed first with hot water, acidified if necessary with a little sulphuric acid ; then with lime water applied with a rag and finally with clean hot water.

The pots containing the *rab* should be placed near the machine. One pot should be broken at a time and the contents taken out by means of a scraper (*khurpi*) into a clean brass or copper pan, any lumps which may be found in the *rab* being broken with the *khurpi* or crushed with the fingers. About 8 to 10 seers of the *rab* should then be transferred from the pan to the centrifugal. About half a seer of molasses should be taken into a *dori* (a round vessel to which a wooden handle is attached) and about one dram (four mashes) of bicarbonate of soda dissolved in an ounce of water should be thrown into the *dori* and mixed with the molasses by the hand till the liquid becomes frothy. This liquid should then be poured into the centrifugal over the *rab* and the latter well stirred. The machine should then be set in motion by four labourers (the latter being relieved at intervals), who should continue to revolve the handles until the molasses have been completely separated from the crystals. An indication of this point having been reached lies in the molasses coming out of the spout in drops instead of in a stream.

When the centrifugal is stopped, the sugar will be found adhering to the inner surface of the cage : it should be fairly white. This colour can be easily seen while the centrifugal is in motion. If, however, the colour be not entirely satisfactory, it should be washed with either a decoction of soap nut (*ritha*) or a distillate of the substance. *Ritha* is a well known fruit easily obtainable in all towns in Upper India. To make a decoction about half a seer of *ritha* should be boiled in about 20 seers of water and the liquid strained through a sieve. To prepare a distillate about one seer of *ritha* should be pounded and thrown into about 8 sers of water, which should be then distilled in an ordinary *qara-ambiq* (retort) such as is used by native druggists.

This distillate acts satisfactorily as a decolorizer and should be applied warm with a brush of *munj* grass, while the cage is revolving at full speed. If the washing is done properly the sugar in the cage should be perfectly white, identical with the best *khand* in respect of colour, but superior to it in the size of crystals and brilliancy, and in freedom from foreign substances. When the machine has stopped, the sugar should be scraped out with a wooden *khurpi* and dried in the sun. If the crystals are then found to be very much larger in size than those of ordinary *khand*, or if the colour is not perfectly white, the cured sugar should be very gently ground at once on a stone slab with a *belan* (wooden roller) before it is dried in the sun and should then be passed through a sieve, or it may be ground in a mill.* This process of gentle grinding is known in Rohilkhand as *kasna*.

* A grinding mill for this purpose has been devised and is under trial.

As soon as the sugar has been taken out, the machine should be charged again and the methods described above followed. After every two or three charges the wire mesh should be carefully wiped with a piece of rag dipped in *hot water* to prevent the perforations from being choked.

Broadbent's machine is sufficiently strong for hand-power. The only part which wears out quickly is the socket in which the spindle of the cage revolves. When this happens the movements of the cage become eccentric and the sugar is not cured properly. It has, however, been found that a new socket can be easily manufactured by a good native mechanic, and if this part wears out it should be at once replaced by a new one, and the machine will then run smoothly again.

VIII.—TREATMENT OF MOLASSES.

The best thing is to sell off the molasses if possible. In Oudh we have sold it at the high price of 15 to 16 seers per rupee, as it is readily purchased by confectioners, being quite fresh and fit for making sweetmeats. But when the factory is working on a large scale or in a small village it might be difficult to find a ready sale for the greater part of the molasses on the spot. In such a case it would be worth while to boil the molasses down to *gur*. The method of manufacturing *gur* from molasses is fully known to the manufacturers of Rohilkhand where professional boilers can be employed on payment of reasonable wages. The only improvement which I have made on their method, and one which has been much appreciated, is the addition of a little bicarbonate of soda or potash to the boiled mass when it is spread on the *chak* (earthen wheel) to be cooled before being made into balls. This treatment very considerably improves the colour of the *gur* which, consequently, commands a distinctly higher price than the *gur* made from molasses of the ordinary native factory.

IX.—THE SUGAR SEASON.

A few words may be said about the effect of weather on the quality of *rab* and the outturn of sugar. No doubt the best season for manufacture of *rab* both under the old and the new system is the dry cold weather when the *rab* sets quickly and the grains become quite firm within four or five days. Rainy or cloudy weather which generally comes on for a few days about the middle of the cold season, and is usually characterized by prevalence of easterly wind, is alleged to be unfavourable for operations generally, but whether it affects the quality of *rab* injuriously is doubtful. In such weather it is necessary to thatch the boiling plant over with a *chappar*, because if rain gets into the juice while it is boiling, the *rab* will be seriously damaged.

The higher outturns of sugar are obtained usually from *rab* manufactured in the latter part of the season, from the middle of February to the end of March, when the cane is fully mature. The *khandsari* usually closes his boiling operations soon after the Holi festival, i.e., when the warm weather has commenced. It is alleged that when the weather is warm the *rab* does not set properly and contains a very high proportion of molasses to crystals. Every care is therefore taken to finish off the boiling work within a few days.

after the Holi, if not before that festival. To attribute the poor quality of *rab* made in the warm weather to the effects of season is decidedly a mistake. The reason really is that under the *bel* system, the juice, which is as a rule kept for several hours in the earthen receptacles sunk at the foot of the mills, gets so fermented in the warm weather, that it becomes practically unfit for boiling. I have continued boiling under my system quite successfully until the middle of May, but always taking care that as soon as about 20 seers of juice had been expressed by each mill it was heated to a high temperature in the clarifier to prevent inversion.

I have heard of standing crops of sugarcane which could not for some reasons be cut at the usual time, being burnt off in the hot weather, being then regarded as useless for the purpose of manufacture of sugar under the *bel* system. Such waste would be entirely avoided by the new method, in which the immediate heating of the juice cannot be helped.

The native method of manufacture of sugar from *rab* is obviously unsuitable for the hot weather and more so for the rainy season. Absolutely no sugar is consequently made by *khandsaris* during the rains. The *rab* has necessarily to be worked into *khand* before the rains. The *rab* made under our system does not deteriorate in that manner, at any rate not to the same extent, and I have quite successfully kept *rab* and made high class *khand* from it throughout the year; only the percentage of sugar obtained from *rab* in the latter part of the rainy season was slightly lower than usual, but the quality of sugar was very superior. These advantages of the new method must be regarded as most valuable, as the *khandsari* will be able, if he stores a sufficient supply of *rab*, to continue his work throughout the greater part of the year instead of only about six months.

X.—OUTTURN OF SUGAR.

The ordinary *bel* of Rohilkhand works up about 4,000 maunds of juice in a season: larger *bels* are said to work up to as much as 8,000 maunds, but in their case we have not entirely trustworthy figures of the yield of sugar. Taking as a standard a *bel* working up 4,000 maunds of juice, it is usually assumed that 800 maunds of *rab*, or 20 per cent., is a maximum yield. About 33 per cent. of this, or say 265 maunds of *khand* may be hoped for, together with about 430 maunds of molasses; thus about one-eighth of the *rab* is lost during the later stages of the process. These figures represent a thoroughly satisfactory outturn under the existing system of manufacture.

With the improved plant and methods described above about 8,000 maunds of juice can be conveniently dealt with. Of this about 1,480 maunds, or 18.5 per cent. is obtained as *rub* on the average of the various experiments. Thus the yield of *rab* is slightly below that of the old system, but the difference is in water and dirt not in sugar. From 1,480 maunds of *rub* the new system has given, on the average of different determinations, 680 maunds of *khand*, or about 46 per cent.: the actual percentage has varied from 40 to 52, and in one exceptional case 57. There will also be about 800 maunds of molasses, so that the loss of *rab* under the new system is nominal, being limited to the trifling amount that sticks to the different implements.

To compare the outturn obtained under the old and new system it is necessary to double the figures for the former given above : then from 8,000 maunds of juice in each case the outturn will be as follows :—

		Old system.	New system.
Rab	...	... 1,600	1,480
Khānd	...	... 530	680
Molasses	...	... 860	800
Loss	...	... 210	nominal.

This comparison is favourable to the old system in that a high outturn of *rab* is assumed, probably from 60 to 80 maunds more than is obtained on the average.

As regards value, the *khand* made by the new system is distinctly superior to the old, but for comparative purposes the two may be valued at the same price, which may be put at Rs. 9 per maund. The molasses obtained by the new system are an altogether different article to what are now produced, and can be safely valued at Rs. 2 per maund against Rs. 1.8, the current price of the existing product.

At these rates the value of a season's produce under the old system is Rs. 6,060 : under the new Rs. 7,720. After making every possible allowance, there can be no doubt therefore that the new process yields a much more valuable outturn than the old from a given weight of raw material. It remains to examine the cost of this increased yield.

XI.—COST OF PRODUCTION.

The cost of the juice is the same in both processes, and may be taken at Rs. 32 per *saikra*, a unit which is equivalent to $62\frac{1}{2}$ standard maunds, or Rs. 4,096 for the quantity dealt with in one season. The cost of making *rab* by the old system is fairly well ascertained, and may safely be put at Rs. 8.6-0 per 100 maunds of juice, a rate which includes the annual erection of the *bel*. This gives Rs. 670 for the season. The cost of making *khand* may be put at Re. 0.8-0 per maund of *rab* used, or Rs. 800 : so that the total working expenses of the old system are Rs. 1,470. Under the new system, the cost of boiling is greatly reduced being only Rs. 285 exclusive of the cost of fuel, but the erection of the furnace costs more : the two items together come to Rs. 510 as against Rs. 670. The cost of making *khand* may be safely put at about $9\frac{1}{2}$ annas per maund of *rab*, or Rs. 880 for the season : the total working expenses are therefore Rs. 1,390 or appreciably less than under the old system.

The accounts then stand as follows :—

	Old system.	New system
	Rs.	Rs.
Value of produce ...	... 6,060	7,720
Cost of juice ...	... 4,096	4,096
Working expenses ...	... 1,470	1,390
Profit (interest, depreciation, and earnings of management),	494	2,234

It is difficult to estimate the interest that should be allowed : but as most of the capital goes in the purchase of raw materials (which cost the same in both cases), and as the new process enables the sugar to be put on the market some months earlier than is possible under the old, the amount of interest is practically the same in both cases.

The boiling plant used in the new process as described above costs us Rs. 400. A set of pans for an ordinary *bel* costs Rs. 300 and the cost would be close on Rs. 400 for a *bel* of the large size assumed : the greater cost of copper is saved in the simpler process of construction of the new pans. Thus interest and depreciation of the pans will be about the same in both cases.

Three centrifugal machines will be needed with plant of the size described in order to work up the *rab* promptly.¹ Their cost will be Rs. 1,250. On these figures it will be seen that a manufacturer who works the new process as successfully as it has been worked in our experiments could pay for the three centrifugals out of his first year's profits, and yet have a materially larger balance of profit than one who worked the old system ; after the first year his profits would be very much greater : or to put it in another way, if the centrifugals last only three seasons, (and they ought to last far longer), one-third of their cost can be charged against each year, and the balance of profit under the new system will still be more than three times the profit under the old.

Implicit reliance cannot of course be placed on the details of these calculations ; but there is such an enormous margin in favour of the new system that it can be confidently recommended for trial, provided the man employed to manage the boiling has been trained practically in the details of the various operations.

The following details of the cost of operations will be of interest to practical men. The daily cost of working the boiling plant, exclusive of the cost of fuel, is approximately as follows :—

	Rs. a. p.
Pay of head boiler	... ... 0 6 0
,, second „	... ... 0 4 0
,, daroghá	... ... 0 3 6
,, clarifier	... ... 0 3 0
,, two firemen	... ... 0 4 0
,, two coolies ..	.. 0 5 0
,, one chaukidár	.. 0 2 0
Cost of earthen pots (including cartage)	.. 1 0 0
Soda, <i>sajji</i> , <i>deula</i> , &c.	... 0 8 0
 Total	 3 3 6

¹ One centrifugal will deal with 130 to 150 maunds of *rab* in a month : with three machines, the quantity produced will be worked up in about $3\frac{1}{2}$ months ; if two machines are used about $5\frac{1}{2}$ months will be necessary.

For working three centrifugals the daily cost will be :—

		Rs.	a.	p.
Pay of mistri	... ...	0	8	0
" 24 labourers at 3 annas for working the machines	... ...	4	8	0
" bhishti	... ..	0	3	0
" 12 labourers (for handling the sugar and miscellaneous work)	... ..	1	14	0
Oil	... ..	0	4	0
Chemicals	... ..	0	6	0
		<hr/>		
Total	... ..	7	11	0
		<hr/>		

With eight labourers to each centrifugal, work can go on easily for eight hours a day, during which each machine will deal with about five maunds of *rab*. Thus the actual cost is practically eight annas a maund: but in the foregoing account it has been put at nine annas six pies to allow for occasional loss of time.

It should be added that the cost of working can be considerably reduced if power for driving the centrifugals is available, but we are not yet in a position to say whether the saving would be sufficient to pay for a steam or oil engine, and the use of centrifugals worked by hand is perfectly practicable. Of course if the sugar manufacturer has an engine standing idle, it will pay him exceedingly well to drive the centrifugals by its means, and the hand machines can be easily adapted to power working.

APPENDIX II.

[The papers printed in the text of the Report were contributed at the request of the organisers of the Conference. Those printed below were sent by the writers of their own accord.]

INDIAN AGRICULTURE.

BY KRISHNA RAO DESHMUKH, Esq., *Plaider, Wardhu.*

According to the eastern sages agriculture is the first and best occupation in life. It is the most healthful, useful and noble occupation of man, said Washington, whose name is immortal for his love of truth in his boyhood and love of liberty in his manhood. The ancient Romans had great enthusiasm for agriculture. Cicero and Cato were the great admirers of agriculture. Cato said, "I come now to the pleasures of husbandry in which I vastly delight. They are not interrupted by old age and they seem to me to be pursuits in which a wise man's life should be spent. The earth does not rebel against authority. It never gives back but with usury what it receives. The gains of husbandry are not what exclusively command it. I am charmed with nature and the productive virtues of the soil. The whole establishment of a good and assiduous husbandman is stored with wealth. It abounds in pigs, kids, lambs, poultry, in milk, in cheese and in honey."

SPECIAL IMPORTANCE OF AGRICULTURE IN INDIA.

If there is any country solely and wholly dependent on agriculture, it is India. The peasant is the backbone of the country and the land revenue derived from him is the backbone of the imperial finance. Native arts, indigenous industries and country-manufactures died out under foreign competition. Out of 100 of the Indian people, 85 depend on agriculture as the means of their livelihood. India, therefore, has become an agricultural country. Agricultural industry is the only industry from which all other industries draw their life-blood. In fact, agriculture constitutes the nucleus and foundation of all other enterprises. In the present crisis, agriculture is the hope and strength of India.

THE PRESENT STATE OF AGRICULTURE IN INDIA.

No doubt, the art of agriculture is known to the Indian peasant. But the art has come down to him, unimproved, from generation to generation. It is deteriorating every day. The science of agriculture is hardly known to him. Nature is bountiful to him but her bounties are hardly appreciated. He is still content with his old-fashioned plough.

In economy of means of production and in the practice of organized self-help, the Indian cultivator is generally ignorant and backward. Our agriculture is in a moribund condition. The reason of such a deplorable condition is not far to seek. It is this—that our agriculture is left in the hands of an ignorant and illiterate class of cultivators, to chance, and to *nasib* (caprices of fortune).

There are two classes of cultivators:—

The first class comprises persons owning land and cultivating the fields with the help of their own wives and children. They are illiterate, ignorant and deeply indebted. Ignorance and poverty have debased their mind and rendered them unfit for any scientific progress, in their present condition.

The second class of cultivators are persons who own lands and invest money in the agricultural enterprise. They may be called the landed gentry. They possess capital, intelligence and ability. But they do not take any personal interest in cultivation. They leave everything to their steward who is ignorant, illiterate and low paid. He leads and guides all the agricultural operations. He does not know that climate, location, varieties, culture, handling, packing, and marketing, each has a place in successful cultivation and stands vitally related to the rest. Indifference to any one of them may bring failure to the best directed efforts.

Ignorance, negligence and indifference are displayed at every stage of agricultural operations. No care is taken for the selection of suitable soil for suitable crops. No attention is paid to the selection of good seed. The land is not well manured. The waste of manure is something startling. The rules of weeding, thinning, pruning, are more honoured in their breach than in their observance. The principles of neatness and cleanliness in harvesting and marketing are hopelessly overlooked and the result is nothing but loss in the agricultural concern. The outturn is hardly sufficient to cover all expenditure incurred in cultivation.

Hence our cultivator is going from bad to worse. His annual income has been reduced from Rs. 28 to 20, since 1880. Half of the Indian population do not know from year's end to year's end what it is to have their hunger fully satisfied. Forty millions of the Indian population live on the verge of starvation. The Indian peasant has lost his staying power and a single failure of crops brings on famine in the country. He has lost all vitality. At the very first appearance of an epidemic he is liable to succumb.

THE PRESENT IDEAL OF CULTIVATION.

Our present ideal of cultivation is not high. The general belief is that no talents, no abilities, no originality and no learning are necessary for an agricultural pursuit. Any youth found unfit for any other profession is thought to be the best fitted for an agricultural career. The sooner we get rid of this notion the better.

SCIENTIFIC AGRICULTURE.

The necessary condition of success in agriculture is that, hand in hand with culture of land must go culture of the mind. The secret

of success lies in blending experience with theory, practice with science, progress with prudence and work with study. This can be best accomplished by uniting mental work with manual effort, combining science with art, and by transforming thought into action.

Scientific Agriculture means the utilization of scientific knowledge to secure the best possible results from the practical agricultural pursuits with the greatest possible economy. The study of science enables a man to understand, guide and control the natural forces that create all industrial progress. The sciences that play an important and prominent part in the field of agriculture are Chemistry, Botany, Geology and Veterinary Science.

GOVERNMENT AID IN THE CIVILIZED COUNTRIES.

In England, Denmark, Holland, France, Germany and the United States and Canada in America, great prominence is given to agriculture, even though the people do not entirely or even mainly depend on it. The urgent necessity of agricultural knowledge on a scientific basis is recognized. Large amounts are liberally spent on agricultural improvements. The scientific knowledge is systematically extended. Botanical gardens are fully equipped with laboratories and herbariums. Numerous experimental stations are established. The State organization consists of scientific and practical experts whose time is solely devoted to making improvements in every way possible. Steady and constant efforts are being made to improve the indigenous products. Exotic products likely to repay the cultivator are eagerly sought after. Those directly interested as cultivators or indirectly interested as manufacturers and exporters are encouraged to co-operate with the State, in the acquisition and dissemination of agricultural knowledge. Through the medium of the Central Intelligence Office, pamphlets, and journals agricultural knowledge is brought to the threshold of every cultivator. The gospel of agriculture reaches every poor cottage. The agriculturists freely and confidently turn to the State departments for help and advice.

SELF-HELP IN THE CIVILIZED COUNTRIES.

In the civilized countries mentioned above the people are not prone to succumb to difficulties and accept them as inevitable. They know that difficulty is the condition of success and it is a severe instructor. They do not say that "there is a lion in the path." They do not depend upon the Government for everything. They have great faith in themselves, in their own power and strength, in their own energy, industry and uprightness. The secret of their success lies in their power of self-help, organization and co-operation.

In England patriotic societies were the means of collecting a vast mass of statistics and general information connected with agriculture. They diffused agricultural knowledge amongst the cultivators. These national associations were soon aided in their important labours by numerous local societies which sprang up in all parts of the kingdom. So far back as in 1800, the original *Farmer's Magazine* entered upon its useful career. In 1842, an

Agricultural Chemistry Association was formed, funds were raised, and eminent chemists were engaged for the express purpose of conducting investigation.

At the annual shows a prominent place is assigned to implements and machines. The extent and the rapidity of the improvements in agricultural machinery which the society was mainly instrumental in effecting, are altogether extraordinary.

Market towns of importance have their organized clubs. There are Agricultural periodicals ably conducted and widely read.

The facilities afforded by railways for cheap and expeditious travelling induce most farmers to have an occasional peep at what is going on beyond their own neighbourhood. This, more than anything else, deals a deathblow to prejudices and extends good husbandry.

The literature on agriculture has been enriched by the contributions of many able writers.

In the United States of America in 1867, granges were started. Granges mean associations of farmers designed to further their interest and particularly to bring producers and consumers, farmers and manufacturers, into direct commercial relations without the intervention of middlemen or traders.

Now, in America, these granges wield an immense influence both on the people and the Government.

RESULTS OF SCIENTIFIC CULTIVATION.

The results of scientific cultivation are marvellous. By the help of scientific knowledge America produces 600 lbs. of cotton and 28 bushels of wheat per acre, whereas we in India produce 60 lbs. of cotton and 7 bushels of wheat per acre.

In Florida oranges used to be seriously damaged by frost but the scientific men found a remedy to overcome the difficulty. Cross fertilization of oranges of superior variety with inferior ones was found effective in resisting the attacks of frost and saving the crop from damage.

Inoculation of land in America is one of the wonders of science.

GOVERNMENT AID IN INDIA.

The Department of Agriculture has been in existence for a long time. The experimental farms have been doing their work for many years. But until recent years, what was going on within the four corners of the experimental farms was hardly known to the outsiders and much less to the real cultivator.

The Famine Commission of 1900 pointed out in unmistakable terms that the steady application to the agricultural problems of expert research was the crying need of the time. The Government changed their policy and began in right earnest the work of agricultural improvement. Now the agricultural staff is being strengthened. The experimental farms are being extended. The schools of agriculture are being increased in number. An agricultural institute has been

started at Pusa, and it was described by Sir D. Ibbetson as the first important outcome of the new departure in the development of agricultural enquiry and experiment, which is the crying need of the country.

The question that was very prominently brought before the Agricultural Conference held at Pusa, was how to teach the real cultivator, and several suggestions were made to solve that question. Agricultural journals are being issued and agricultural associations started. But all this is a mere beginning when compared with what is done by the Governments of other civilized countries. Anything, if well begun, is half done. Attempts are being made to enlist the sympathy of the cultivators and to popularize the Government institutions. It is with a sense of gratitude that we should acknowledge the good work that is being done by the Government to promote the cause of Agriculture.

THE SPIRIT OF SELF-HELP IN INDIA.

Now we come to a very unpleasant and unpalatable question. That question is one of self-examination. It is very easy to find fault with others and to load others with reproaches. It does not cost much to say what others should do for us. It is very difficult to determine what we should do for ourselves and do it with determination. The true ignorance of man lies in not knowing what he should do. Our educated Indians and our leaders have fully recognized the urgent necessity of scientific improvement of cultivation. They have completely appreciated the worth of the art and science of agriculture. They have thoroughly realized the value and importance of the improved methods of cultivation. That being so, what have they done to promote the cause of agriculture? The only answer that can be given is a negative one. They cannot claim anything to their credit except perhaps a few speeches and the Industrial and Agricultural Exhibition held along with the sessions of the Indian National Congress within the last few years.

DUTIES AND RESPONSIBILITIES OF EDUCATED INDIANS.

Ignorance is a great hindrance and education is a great power. Power means responsibility. To achieve success in agriculture, educated Indians have got a threefold duty to perform :—

1st :—To educate the masses, to enlighten them, to influence their destinies and guide their thoughts.

2ndly :—To kindle a genuine enthusiasm in the wealthy classes and big zamindars and middle classes. To inflame patriotic feelings and awaken the sense of duty in them. To induce them to employ their capital in the development of agriculture.

3rdly :—To advocate the cause of the poor cultivators. To help them and protect their interests in the matter of legislation. The heavy assessments, the short-term settlements and the restrictions on their power of alienation of land are their principal disabilities and grievances. Concentration of efforts in these times of strenuous competition is the most essential element of success. This

is the age of combination, and to hold our own in the mighty struggle for existence we must unite and benefit ourselves. The individual is but an insignificant factor compared with powerful organizations.

We must form companies, raise funds and start co-operative movements for promoting the art and science of agriculture. The European companies in every trade, commerce and industrial enterprise, furnish a most interesting and instructive instance of the wonderful and mighty results that can be obtained by uniting capital, labour, intelligence and industry and energy. By means of these companies they have conquered the trade of other countries, and have even conquered many territories. The companies of the mill-owners in Bombay and at other places have proved that the Western example can be successfully followed in the East. However, we have no companies for the development of cultivation and improvement of the agricultural processes. Messrs. Wallace & Co. have started a joint-stock company for the cultivation of long-stapled cotton in Behar and the concern has proved to be profitable.

We must have our agricultural granges, clubs, associations, libraries. We must have our chemical analyzers. We must send some students to America and Japan to learn the science of agriculture. Some practical experts in agriculture must be sent to these countries, to see what improvements can be successfully adopted in India.

India has a bright future before her. She can produce much cotton and much wheat and can meet the local wants and can export them to other countries and thus enrich herself to avert famine.

The future of India depends upon successful agriculture, and successful agriculture depends upon a thorough knowledge of business, and business on business principles.

The agricultural industry is the principal industry on the success of which all other industries of India must depend. Every right-thinking man interested in the salvation of India must do his duty to the motherland. Officials and non-officials, Indians and Anglo-Indians, Hindus, Muhammadans and Christians, one and all should make a common cause, remembering the noble words of Goldsmith :—

“ But a bold peasantry their country’s pride
When once destroyed, can never be supplied.”

“COTTON : AND HOW TO BRING INDIAN COTTON TO INDIAN HOMES.”

BY BABU PRAPHULLA CHANDRA GHOSH, B. A.

The subject of my discourse is very homely. It is cotton. A very remote antiquity is assigned to its growth and manufacture. The word is derived from the Sanskrit *Karpas*.

The cotton plant belongs to the genus *Gossypium* and to the natural order *Malvaceae*. The chief varieties are: *Gossypium herbaceum*, *Gossypium arboreum*, *Gossypium neglectum* and *Gossypium barbendense*.

India is the largest cotton-growing country in the world. The clothing of its people has from antiquity been chiefly made from cotton. Necessarily, India has matured a system of hand-spinning, weaving and dyeing unknown in any other country.

During the middle ages India manufactured and carried on an extensive trade in cotton goods. To such a degree did this branch of industry rise that some of the fabrics produced have attained a world-wide celebrity never before equalled. In the early years of the East India Company merchants and traders occasionally advanced remittances to India to keep the Indian weavers engaged in the production of those fabrics and gave them every encouragement and support. But since the establishment of the British Dominion the demand for such cotton fabrics has fallen off and their trade has totally languished.

The Indian cottons belong either to the species *Gossypium herbaceum* or to that of *Gossypium neglectum*. Sometimes cotton of other varieties is found which belong to a third species *Gossypium arboreum*.

Gossypium herbaceum is known by the fact that it puts forth a number of side branches and has lateral development, and it therefore requires much room for each plant to develop properly. It has broad leaves with the cuts shallow. It bears light-coloured flowers. It has large, round, plump and smooth bolls with large seeds and long, soft, fine, silky wool. *Gossypium neglectum* has tall erect plants of few side branches, deeply cut leaves, yellow flowers with red spots at the base, elongated, shrunk and shrivelled bolls tapering in a sharp point and having small seed and coarse, harsh, short wool. Plants of the *Gossypium arboreum* species resemble those of the second with the exception only that they possess hairy, glandular, and dotted leaves. Their seeds are removed from each other, covered with white cotton overlying a dense green or blackish down and the cotton is not readily separable from the seed. To this species belongs the purple-blossomed plant that produces red silky cotton grown about the temples.

The parts of India which grow cotton are Bengal proper, Chota Nagpur, Behar, the Doab of the Ganges and the Jumna, the Central Provinces, the Berars, parts of the Panjab, the Northern districts of the Bombay Presidency and a few of the Southern districts of the Madras Presidency.

Bengal, Chota Nagpur, and Behar grow chiefly the species *Gossypium herbaceum*. The principal varieties of this species are : Gach Kapas, Bhoga, Athia or Desi Kapas, Barhiya and Bareya.

The varieties grown in the Bombay Presidency are the American species of the Sea Island, Mid-Uplands and New Orleans. The cultivation of these exotics in the soils of the Presidency has proved successful. The chief reason for this is that the climate of the cotton-growing States of America and that of the Presidency during the growing period are similar. The districts which grow most cotton are—Broach, Surat, Ahmednagar, Khandesh and Dharwar.

In the Central Provinces and Berars the yield of cotton is great owing to the black clay soil existing all over that part of the country. The principal varieties grown are : Bari and Jhai of the Central Provinces ; and Hingunghat and Amraoti of the Berars

In the United Provinces longer stapled cottons of the United States varieties Watagodu, Allen and Cooke and several other exotic as well as indigenous varieties are grown. The climatic conditions of the districts lying on both sides of the Ganges and the Jumna in these provinces are favourable to the growth of foreign species and the same success as has been achieved in Bombay can also be attained here.

The production of cotton in the Panjab is variable. The ordinary climatic conditions are uncongenial to its growth. But the quantity which grows is due to the inundation of the Indus and its tributaries.

The produce which Madras yields is not superior nor is it heavy. But it is enough to supply the demands of the mills working in the Presidency. The varieties grown are the Salems and Tinnevelly.

There are two methods of cotton cultivation prevalent in India. They are (1) *Kachwa* or *kachhauni* and (2) *Daha* or *dahil*. *Kachwa* or *kachhauni* literally means 'uncooked' as distinguished from 'burnt,' which is the literal meaning of the *daha* or *dahil*. The *kachhauni* method is the ordinary one and in use everywhere except in hilly and jungly tracts. The *daha* process is adopted in the latter areas only. This system consists in burning a thick layer of wood over a cleared ground before sowing the seed. The object of the *daha* system is (1) to burn up the soil and thus to free its manurial ingredients ; (2) to destroy all grasses and weeds by thorough burning, and (3) to leave a layer of ashes over the ground. This system resembles the practice of burning clay soils which is followed to a certain extent in the clay districts of England and the advantage claimed for the English practice that it sets free a portion of the potashes and other alkalies in the soil is also secured by the *daha*. The land after the *daha* is performed is left without further treatment until the rains set in. In *Asar* (June-July) the seed is sown on the field. The land is then ploughed and again allowed to rest. No harrowing is done. As soon as seeds germinate and leaves burst forth, the field is fenced round. Once in *Sravan* (July-August) and again in *Bhadra* (August-September) weeding takes place. The flower appears at the end of *Bhadra*. The pods form in *Aswin* (October-November), and then the cotton is gathered. The yield of *daha* cotton is larger than that of *kachhauni*.

In the cultivation of *kachhauni* cotton land is ploughed in *Asar* (June-July) and seed sown without manuring. The crop is ready by *Aughryan* (December-January) and is then gathered. *Kachhauni* cotton may be reaped at any time as soon as ripe.

The few special requirements necessary for the cultivation of cotton are—(1) A sufficiently long growing-season for the plant to mature. This season must be very warm and hot, and if also humid and equable, so much the better. Provided the mean temperature is sufficiently high the plant grows and develops, but more quickly and luxuriantly in a humid atmosphere than in a dry one ; (2) a clear weather of about two or three months for the picking season free from rain and clouds ; (3) a loamy soil that will supply sufficiency of moisture throughout the life of the plant whether from rainfall or from irrigation, but at the same time open and high enough not to suffer from stagnant water. To overmuch moisture in the soil the cotton plant generally and the longer-stapled varieties particularly, are highly sensitive specially in the early stages of growth. The longer the staple, the more open and sandy must the soil be.

Besides the three chief requirements the other points to be observed in the cultivation of cotton are :—

1. *Tillage*.—It is enough to mention on this head that the deeper the first ploughing the better, and the deeper the ploughing the heavier the yield.

2. *Sowing*.—The seeds are to be sown as they are, but occasionally they are to be mixed up and rubbed with cow-dung to separate the seeds from one another.

3. *Manuring*.—Cotton fields require to be invariably manured. Ashes are considered the best for cotton, but poudrette, town-sweepings, hard mud, non-edible cakes, saltpetre are often used as well.

4. *Mixtures*.—The only mixture that will produce results commensurate with the value of land devoted to it is cotton and maize in alternate rows with a space of two feet intervening.

In course of time the British merchants learnt the mode of producing the Indian fabrics and utilized their knowledge by the help of improved machinery and science to produce similar stuffs in England. They had already realized the extreme profitableness of the industry by their experience. In the year 1787 a mill for manufacturing cotton-stuffs was established in England. The English manufactures soon supplanted the Indian in the European markets, and by reason of their being more neatly and evenly made and finer in texture delighted the Indians, who began to use country-made stuffs less and less. The weavers previously patronized by the East India Company were now thrown out of work. Some of them gave up their time-honoured craft and took to other callings. Those who still clung to their hereditary avocation lost all heart, and, finding no market for the fine stuffs which they produced, they restricted themselves to weaving coarse stuffs just sufficient to meet their own requirements and local needs.

At the present moment the question of supply of cotton goods has been exercising the minds of all true and patriotic Indians. The proper solution of the problem depends upon how they meet the cloth supply for which Manchester (veritably called Cottonopolis) has the sole monopoly. Organized and sustained efforts are needed in this direction. The first step needed in this way is the cultivation of superior quality of cotton on an extensive scale. At present the growing of cotton is on the wane in nearly all parts of the country except in the Bombay Presidency. The decline has been due partly to our total apathy and predilection for growing food staples, partly for want of improved methods of cultivation, and partly owing to the heavy import of foreign cotton goods. But now we have to take to the growing of cotton on a larger scale than at present with interest and zeal. We have also to adopt a mode of cultivation which is based on proper scientific knowledge. We have also to be supplied with seeds of improved varieties of cotton.

The second step is that strong inducements are to be held out to weavers to give up their adopted calling and resume their own. We have to form in different parts of the country committees whose duty should be to keep themselves in touch with local weavers and make them advances in money and yarn. Mr. Jamshedjee Ardasir Wadia, a well-known mill-owner of Bombay, writing in vindication of the *Swadeshi* movement, observes that India ought to be perfectly able in a short time to supply her own requirements; and as the result of the movement he anticipates a considerable increase in the quantity of cloth manufactured by hand-loom weaving which, he avers, has vast potentialities on account of the industry, thrift and good sense of the Indian weavers. The hand-loom industry still supports a vast majority of weavers. Hand-looms of the type used at Serampore and Kushtia, Bengal, or like that constructed by Mr. Churchill should be largely brought into use and be supplied to our weavers on the hire purchase system. Every Indian household also should resort to the old ways of ginning and spinning cotton with the time-honoured *Charkha*. Dr. Watt, speaking of the functions of the *Charkha*, says that 'on an average it can spin 6 to 8 lbs. of clear cotton per day.' Indian spinning, says Professor Royle, 'though rude in appearance is well-suited for the purpose for which it is used.' Attempts should, however, be made to improve the *Charkha*.

The writers of the book called 'Hand-loom Weaving for India' have proved from the evidence of facts that hand-looms can survive the competition of power-looms. Their most convincing argument is that the hand-loom fabric gives nearly twice as much wear as the average mill-cloth by reason of its possessing more strength and durability than the latter owing to the following causes:—

- (a) The use of antiseptics and germicides necessary to protect a large stock of goods from vermin, damp, &c., impairs the tenacity and strength of the cloth.
- (b) 'Sectional' sizing as adopted in mills does not strengthen the warp so much as 'single' sizing as in vogue among hand-weavers.
- (c) In the power-loom the picking motion being very rapid, the web is not so firm as in the hand-loom where the weft thread and selvage are put in more carefully.

The Parsi merchants of Bombay have prepared the ground for the mill industry in India. Kabasjee Nanabhai Dabar founded the first Indian cotton mill in 1855. The activity, spirit of enterprise and zeal which have always characterised our brethren of the Western Presidency have led them to add to the number of mills year after year. The impetus which they have thus given has encouraged people of other Presidencies to follow them. In the year 1896 there were 154 mills employing 37 thousand looms, 80 lakhs spindles and over a lakh of hands. In the year ending March 1905 there were 200 mills. Of these 9 were still under construction, the remaining 191 at work. Nearly 60 thousand looms, 70 lakhs spindles and over 2½ lakhs hands worked in those mills. A capital of 54 crores has been invested in them. The improvement of the cotton industry in India is wonderful inasmuch as 200 mills were set up between 1855-1905, a period of only half a century. But it is a noticeable fact that Bengal, which is considered the most advanced province, possesses only 12 mills out of this huge number, and a very few of them are owned by natives of the soil.

In the year 1904-1905 there were 2,750 cotton mills in England. They turned out 208 crores worth of cotton goods, out of which India consumed 40 crores worth goods. It is thus clear that India should possess at least 500 mills, i.e., 300 more than the number of mills working at present in order to meet the full requirements of her own.

How can this exigency be met? The question demands our most serious consideration. It is proposed that Bengal should erect a few mills and supply her own demands. The suggestion is encouraging and practicable no doubt. But if it be carried into execution, would such action be wise and expedient? For, the money which will be required for the erection of mills and purchase of the machinery such as will meet the full requirements of the province, would be enormous. At least, 1 crore and 60 lakhs is the estimated amount to set up 10 mills on a decent scale, and it will take no less than five years to construct and bring them into perfect working order. But the situation of the country is such that it cannot afford to spend so considerable an amount and wait for so lengthened a period to have its requirements supplied. Then there is the difficulty of getting trained Indians to manage our mills. The object of the Swadeshi movement will be frustrated if we are to look to England or America to give us mills and mill-managers. I therefore submit that it would be better if the fund which it is contemplated to invest in the erection of mills and the purchase of machinery from foreign lands be utilized in our own country by spending it on the cultivation of cotton on a larger scale throughout the province of Bengal and the revival of the hand-loom industry all over the province on an extensive scale. The matter may be taken in hand by organized companies and the cultivation begun at once with the help of our botanists and geologists. The reason for this humble suggestion is that though Bombay possesses nearly 200 mills, yet it has not been able to concentrate its entire energy on manufacturing cloth for want of raw material. The majority of them are engaged in manufacturing yarn, a few only produce cloth. Bengal may supply cotton and take cloth

from Bombay by way of barter. What is really needed is hearty co-operation with Bombay. Bengal will court failure and disappointment if it works independently of Bombay in the matter of mill industry. Bombay is 50 years ahead of Bengal in this direction. At this stage Bengal can hardly expect to acquire easily that experience in the management of mills which Bombay has taken two generations to gain.

The true solution of the problem of supplying cotton-goods lies primarily, therefore, on the part of Bengal, in its taking up the business of extensively growing a superior quality of cotton and secondarily in developing the hand-loom industry. There will be then no difficulty in achieving success. The people of Bengal have an aptitude for agriculture and domestic industry. The climate of the province is also favourable as it has been held that hand-weaving flourishes better in moist and damp climates.

INDUSTRIAL DEVELOPMENT OF INDIA.

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It is a hopeful sign of the times that a wave of reaction has set in, in the field of industry and commerce throughout the length and breadth of the country, and my countrymen are beginning to realise their true position in the scale of nations. They have been roused from their deep slumber, and as if under the influence of the magic wand of a mesmerist, have been perforce driven to "fresh fields and pastures new." Commercial enterprise now seems to be the burning question of the day, affecting millions. We should therefore take time by the forelock, and exert ourselves to the utmost in nourishing this young plant of spontaneous growth.

Let us all united stand to-day at the sacred seat of science and learning, and with one will and with one voice, pray to the Omnipotent power, that this unconstrained and free love for industrial development of India, may be based on the adamantine rock of unity, organisation, and co-operation of our brethren. The angel of God has put the spark of enlightenment in us, it is new for us to see that "the holy flame may burn for ever."

Dear brethren, it is now an axiomatic truth that India has lost its unique position, which it once enjoyed, of being the leader of western nations in science, art, and philosophy.

The golden age, in which Ram Chandra and Krishna, the ideals of an adventurous and heroic life, flourished, exists only in our memories. In fact the degeneration of India commenced only with the establishment of Brahmanism, with the introduction of the sacred institution of the caste system, and with the prohibition against sea-voyages. These were the three chief factors, tending to check the

onward progress of the nation and to mould its future destiny. Excepting the Brahmans, the followers of the other three castes were not allowed even to touch the Vedas, the scriptures in which the secret treasure of science and learning was stored. Industrial pursuits were only followed by the Sudras or the menial class, and commerce was confined only to the Bania class. It is really a pity that the views of the upper classes were so narrow as to cause them to look on the commercial class with an eye of contempt, and I think the character which Burke gave to the Bania class at the impeachment of Warren Hastings was nothing more than the echo of the wrong notions entertained by the general public of India against the commercial and industrial class. It is, however, much to be regretted that an Indian of to-day, with an inclination for trade, is looked upon with contempt by the Indian aristocracy and high-born classes. We cannot hope to prosper unless we get rid of this wrong notion which we have got into our heads by tradition.

Lord Macaulay once taunted England with being a "nation of shopkeepers," but for the Englishmen of to-day the taunt has lost its point. History teaches us that the very position of England as a world-controlling Empire, has been attained by commercial enterprise. By resolute energy, by the untiring search for new markets and by the courage and honesty of their dealings, the nation of "shopkeepers" has become a "nation of world-governors." Commerce to-day is the key-stone of the policy of all countries and it is not chimerical to hope for the time when the races of our common humanity will have become so completely one another's creditors and debtors, that to wage war will be as reasonable as to destroy the bank in which one's wealth is deposited. Turning over the pages of the world's history, it can be learnt that commerce has been the chief factor in moulding the history of nations, and wonders have been achieved by resolute enterprise in the field of commerce. Even such a trifling article of merchandise as pepper has worked miracles. If the Dutch in the arrogance of their trade monopoly had not, in the closing year of the 16th century, forced up the price of pepper to a point at which the British consumer could not buy, the famous East India Company, who became mistress of India and trustee of that priceless possession, would never have been founded. It is a great mistake on the part of the Indian aristocracy to treat questions of trade and industry with apathy, indifference and even with contempt. Unless the question receives serious consideration from every child of the soil, we cannot win the race of competition with foreign nations. It is, therefore, our first care and duty to do away with the old ideas of commerce, and to instil new life and vigour into the younger generation. But in our enthusiasm and zeal for the furtherance of the noble cause, we should not lose sight of the important fact that to wholly dispense with articles made in foreign countries is contrary to the principles of free trade, and that it will create a broad gulf between India and other civilized countries. High education in India is at a stand-still, technical education in its infancy, and general and free education at the lowest standard. We have to work in the face of these disadvantages, and so we must proceed cautiously.

My dear brethren, we have yet many things to learn from the west, but if you attempt to cut off all communication with foreign countries, and do not keep yourselves in touch with the significant developments of great human movements in various foreign countries, with the best minds of the time, and with great adventurers in the romantic realm of science, you make the young generation sink in the deep abyss of ignorance, and in fact, you place them a hundred years behind the times. Increased knowledge of nature, of the properties of matter, and of the phenomena which surround us may afford to our children advantages far greater even than those which we ourselves enjoy. The extension and improvement of technical and scientific education will, we may reasonably hope, raise them and make them more able to appreciate and enjoy the advantages resulting from western scientific education of a high order, and from realising the truth of the Italian proverb that wherever there is light there is joy. If we view the situation in the light of the remarks made by Herschell there is every reason to live in hope and aspire to rise in the scale of nations. "To what then may we not look forward when a spirit of scientific enquiry shall have spread through those vast regions in which the progress of civilization, its sure precursor, has actually commenced and is in active progress, and what may we not expect from the exertions of powerful minds called into action under circumstances totally different from any which have yet existed in the world, and over an extent of territory, far surpassing that which has, hitherto produced the whole harvest of intellect?" According to this teaching of Herschell, a spirit of enquiry and research is all that is wanted in India at this juncture. Let our children foster this spirit of enquiry and make 'Why,' 'Wherefore,' and 'When' their firm allies, they will then learn to read even the book of nature in their eager desire for knowledge.

" And this our life exempt from public haunt
 Finds tongues in trees, books in the running brooks
 Sermons in stones and good in everything."—SHAKESPEARE.

There is no doubt that owing to want of proper and regular institutions for imparting a thorough and perfect education to boys, and a consequent lack of spontaneity and original thinking on their part, India has won the appellation of a backward country.

Give to our boys all those facilities for receiving high technical and specialised instruction which are enjoyed by European boys, and there can be no doubt that our boys will come off successful even in the field of scientific research. Owing to the sad want of regular scientific institutions and systematic training India could not produce a single man of genius, whose inventions might have been of considerable benefit to the human race, whereas western countries were flooded in the last century with men of genius who had achieved distinction in all the branches of learning, such as Science, Philosophy, Astronomy, and Political Economy, &c. It is still more remarkable that many of the greatest men rose from the lowest rank, and triumphed over insurmountable difficulties. The names of Lord Worcester, Stephenson, and Watt will be remembered for ever, as the invention and introduction of the steam engine was due to their genius and skill.

The names of such men of science and learning as Bacon, Hobbes, Locke, Berkeley, Hume, Hamilton, Newton, the discoverer of the law of gravitation, Adam Smith, the father of political economy, Young, the discoverer of the undulatory theory of light, and Wheatstone, the founder of the electric telegraph, are fresh in our memory. Let our children keep the ideal of the abovementioned men of genius before their mind's eye, and there will be still hope of progress in the future.

The various measures which may be adopted by the people for the regeneration of India may be summed up briefly as follows :--

- (1) To educate the masses so as to raise the percentage of literate men in India.
- (2) To found Industrial and Technical Institutes, on the model of European Institutes all over India.
- (3) To send promising young men to foreign countries to receive technical education of a high order. To meet such expenses national or provincial funds may be created.
- (4) To utilise the services of those Indian experts, who have already returned from foreign countries, and to engage them as teachers in central institutes to be started in each and every province.
- (5) To invite the co-operation of large capitalists in starting new factories to be worked by machinery and other improved scientific methods.

Looking from the standpoint of commerce and industry, the first suggestion relating to the education of the masses is as important as the other suggestions, and it should on no account be undervalued. If you do not impart primary education to the masses you cannot expect any improvement to be made by the illiterate craftsmen in their respective crafts. Take the case of a village potter, a carpenter, a blacksmith or a weaver, and compare him with his brother in Europe. The artisan in India is the same as he was a thousand years ago, while his European brother is always progressive and keeps himself abreast of the times. Indian workers are averse to invention and reform, they will not move a step beyond the limits to which their grandfathers and great grandfathers advanced. The weaving class will not easily equip themselves with fly-shuttle or Japanese looms. Lately I met a friend of mine at Agra, and he narrated the story of a *julaha* who, when he was asked to work on the imported Serampore loom, replied that he could not work on the loom, and if he did, he would be excommunicated from the caste. Such are the traditional training and religious prejudices of the illiterate class. It is, therefore, extremely desirable that at least primary education should be given to the masses. As compared with foreign countries the percentage of illiterate men in India is very great. In the Argentine Republic education is free for children from 6 to 14 years of age, and 50 per cent. can read and write. In Ceylon nearly 90 per cent. of the children of school-going age are under instruction. In New South Wales instruction is compulsory between the ages of 6 and 14. In Western Australia education is compulsory. In Austria compulsory attendance begins with the completion of the 6th year. So is the case in Hungary. In Spain, the most backward country in

Europe, the percentage of illiterates is 68·1. In Japan elementary education is compulsory, but in India only 22·7 per cent. of the boys of school-going age attend school, while the percentage of girls is 2·5 per cent. The number of illiterates in India at a rough calculation is found to be 86 per cent. This is a sad commentary on the history of our people, and we should lose no time in removing this great blot on the national life.

As regards the second suggestion, I may add that with the recent industrial awakening people have already become alive to the necessity of starting regular industrial and technical schools all over India. We should, therefore, invite the co-operation of the people and also invoke the aid of the Government in founding regular technical schools in India after the model of European and American schools, where special studies might be so pursued as to yield the highest intellectual discipline and mental culture.

The art schools of Oxford and South Kensington and the technical universities of France and Germany are model institutions. In all schemes of special training much importance should be attached to general culture and mental discipline. In all these matters Germany leads the way, because the special studies are pursued more with an eye to their disciplinary than to their professional value. The success which Germany has achieved in the commercial world is due to her complete and up to date educational system. We should, therefore, take Germany as a model for founding technical institutions in India on the broad and solid basis of general education.

As regards the third scheme, I may only remark here, that the raising of a provincial or national fund, to meet the expenses of bright and intelligent boys who are inclined to receive technical education in foreign countries but unfortunately have not the means at their command, should be taken on hand at once.

There is no doubt that the Government of India has given encouragement to young Indian boys to prosecute their studies in foreign countries. The Education Commission recommended the establishment of courses of study intended to fit youths for commercial and other non literary pursuits, and the Government of India in its Resolution of October 24, 1884, endorsed the recommendation, adding "that every variety of study should be encouraged, which may serve to direct the attention of the native youth to industrial and commercial pursuits." The scheme cannot, however, satisfactorily be worked out, without the co-operation of the people. It is, therefore, extremely desirable that we should set to work in right earnest, in creating a national fund, and at the same time to guide a fair proportion of the educated classes in the path of industrial pursuits. Those who take an interest in learning applied chemistry, *i. e.*, spinning, dyeing and tanning, may be sent to the Yorkshire College of Science, which is affiliated to the Leeds University, and is best suited for the study of applied chemistry. While those who have a taste for mechanical engineering and watch-making, may be sent to the Geneva Institute, which is open to all and where living is cheaper than in England. Students should, however, know French before starting for Geneva.

As regards the fourth suggestion, I may remark here that those Indians, who have already returned to India after completing their course of education in Japan, America or other countries, should be placed in charge of technical institutes and impart specialised instruction to the students. They would thus confer the benefits of their education on the general public.

As regards the fifth suggestion, I should say that unless we start large factories, and mills to be worked by steam-driven machinery, we cannot manufacture articles of every day use, in sufficient quantity to meet the daily demand. There is much waste of time, money, and energy where only hand-labour is employed, and there is very little margin for profit left for the capitalist in such concerns. If we do not employ up-to-date machinery, we cannot find a ready sale for our articles manufactured in India, nor can there be a market for them in foreign lands. The reason of this is not far to seek. The industrial competition, which is so keen even among civilized countries, runs no longer on the lines of excellence of material and solidity of workmanship, but greatly on the lines of artistic charm and beauty of design. This is the main principle which should guide our countrymen in the manufacture of articles of merchandise if they really want to seek foreign markets.

I now conclude these few remarks bearing on the general principles on which the industrial development of India should be based and hope that the general public will take them to heart. Their Highnesses the Maharaja Gaekwar of Baroda, the Maharaja of Kapurthala, and nine other princes who promised in England, to lend their support to the cause of technical training in India, may only be reminded of their patriotic undertaking.

THE EXPANSION OF COMMERCE IN INDIA.

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This paper is coming out at an anxious time in the history of the Indian nation. There has been great agitation in Bengal. We know that Eastern Bengal and Western Bengal are seething with discontent. Bengal is the scene of a furious struggle over its Partition. People are throwing away European goods in favour of Swadeshi articles. Monster meetings are being held in various parts of India, particularly in the Bengal Presidency. There is no lack of patriotic speeches and stirring appeals in the public press. But, gentlemen, I ask how many of us have given serious thought for devising practical ways and means for the establishment of commercial and industrial institutions throughout the length and breadth of the country so essentially needed for our economic regeneration? How to make this Swadeshi movement a living, lasting success? Not by lectures or big processions, not by monster meetings and sentimental appeals, but by calm business-like grasp of the situation and by setting ourselves earnestly and steadily to work the problem of the

development of our economic resources to supply our own needs of life. Europe and America have become wealthy and prosperous mainly on account of their industries and commerce. Japan is doing wonders; and there is no reason to doubt that we can similarly achieve success if we only avail ourselves of our opportunities. These are : (1) a wide-spread knowledge of the English language in the country, (2) the availability of literature of all kinds, grades and qualities in that language, (3) the facilities of trade and communication with the whole world, and (4) the examples of organisations furnished by the Post and Telegraph offices, the railways, the steam navigation companies and innumerable other institutions. Gentlemen, we do not take enough advantage of the English language. There is not a science or an art which we cannot learn and master if we care to study it in English books and in the Englishman's country. There is not a branch of human study which cannot be carried on to its ultimate end through the medium of this language. There is not a department of human activities which has not been organised and regulated by Englishmen beyond our dreams. The Englishmen possess the character of conquerors, organisers and rulers, and we should study them and imbibe their good qualities so far as we can. They have placed at our service the results of their high intellect and energy in facilitating intercommunication and acquiring a knowledge, both theoretical and practical, of things which the expenditure of crores of rupees would not have provided.

Gentlemen, the Roman empire fell because it was attacked by the Goths and the Huns. The Goths and Huns are pouring into India now in the shape of foreign goods. India must be up and doing, determined both to resist the invader and to establish her own dominion. It is a truly patriotic duty, therefore, for every Indian to help in the development of India's industry and India's trade. But there need be no superfluous patriotism in industrial schemes. Patriotism must be in the business-man's heart, not on his show cards. The industrial patriot must remember that the standard of his productions should be high, that Indian goods should not prove a disappointment to the buyer. If the Indian public should form a general impression, as the result of experience, that, for example, matches made in India fail to light, that sealing wax made in India fails to melt, that pen-knives made in India fail to cut and that lamp chimneys made in India are peculiarly brittle, it is not to be supposed that the public would be so patiently patriotic as to continue to use bad articles for the sake of the Indian manufacturer's benefits. There is evidence in abundance that goods of the very highest class can be made in India, and it is on goods such as these that India's hopes must rest. The manufacturer who turns out high class goods on an economic basis at prices that defy foreign competition and who waits patiently for the reward that sooner or later will assuredly be his is building up India's success and his own.

If Indian commerce is to increase on a substantial scale the Joint Stock system must be developed. Private firms in India are seldom rich enough to finance large enterprises ; and therefore, if large enterprises are to be undertaken, the citizen of India must be taught to invest his money in Joint Stock concerns. The people

must learn to subscribe the necessary capital amongst themselves, then to elect an Executive Committee who will appoint a manager and finally to keep a watchful eye on the developments and look out for their profits. In other words, they must learn to form and nurse Joint Stock Companies for industrial development. But here in Indian towns there is great diffidence even on the part of educated men to invest their money in Joint Stock concerns, and except in and around Bombay, Ahmedabad and somewhat in the Punjab, commercial instincts have not made themselves felt. As long as this backwardness continues, Indian enterprise must remain largely in the hands of private individuals and private firms, and the development of larger schemes will be neglected and delayed. Gentlemen, it should be remembered that the moneylender's capital never increases in its own intrinsic value. A hundred rupees at the beginning of the year is worth a hundred rupees at the end. In the case of careful industrial investments on the other hand, the actual intrinsic value of the shares may increase and the investor profits not only by the interest but also by the increased value of his capital. Say, he invests a hundred rupees in a new industry. If it is successful and pays 8 per cent. at the end of the first year, it is not unlikely that his shares may then be worth, say Rs. 120, so that his actual interest is not 8 per cent. but 28. The profit that is sometimes made in this way by industrial enterprise is enormous. Consider, for instance, the coal mines in Bengal. We will consider one mine in particular, the Katras Jherriah Mine. Some years ago the shares in the Katras Jherriah Company could be bought at par value of 10 rupees. Indian coal then came into demand, and the shares in the Katras Jherriah Company ran rapidly up till they were bought and sold at rupees 42, a dividend having meanwhile been paid at the rate of 40 per cent. per annum. This, however, was not all. The coal fields owned by the Company were larger than the Company could conveniently work and a part of their land was accordingly sold to a new Company, the Sibpur Coal Mining Company, which, in payment for its purchase assigned to each shareholder in the Katras Jherriah Company, free of all cost, four shares in the Sibpur Company, valued at Rs. 5 each, for every four shares that he held in the original concern. The public demand for these shares was such that in a very short time the five-rupee shares were bought and sold at 14 rupees.

Consider the profits of a man who had bought shares in this Company. The Indian capitalist, although he may hope for good profits, must not expect to find this sort of investment open to him every day. I may add that the success of these Indian Coal Companies must be regarded as of an extraordinary kind. The sudden demand for Indian coal was mainly due to the exigencies of the South African war and the extra demand might have dropped off altogether as soon as the war was over, and many a speculator might have been ruined. As a matter of fact, however, this was not the case, for the South African purchases were splendid advertisement for Indian coal, which till that time had been somewhat neglected by consumers.

Gentlemen, people say that some Joint Stock Companies have failed in India. The answer is that no doubt small glass factories,

match factories, and a few others had been started and have failed, but that their failure was due to the fact that they had, as a rule, been started without a sufficient knowledge of the conditions of the industry concerned, without proper technical knowledge on the part of the craftsmen, and without the amount of Capital necessary to equip the work aright, and to keep it going till the industry had turned the corner and profits had begun to come in. A "factory" where the office is a dingy hovel in which a half-naked clerk seated in a broken chair before a rickety table represents the staff and where three or four coolies pottering about on the floor represent the factory hands is not the sort of factory that will succeed in this age of machinery, steam and electricity. Grand offices and steam machinery may not be the requirements for success of all concerns, but things should be sufficiently respectable to beget confidence, and the failure of crude mushroom companies must not be set to the discredit of industrial enterprise.

Gentlemen, it is a regrettable state of affairs when every man mistrusts everybody else. It goes without saying that there are in India crowds of honourable men of unimpeachable integrity, but this general sense of mistrust between man and man must necessarily be a most serious obstacle to Joint Stock development. The best thing for the Capitalist in this matter is that he should be wide-awake, that he should learn to put reasonable trust in his fellowmen, and that he should remember that in a well-organised Company it is not easy for anybody to cheat. The administration of a Joint Stock Company's Capital is very different from the administration of temple funds. With an organised staff under a Manager of experience and of good repute, with a fairly large body of influential directors, and with a responsible Auditor of Accounts, it would be well nigh impossible, if everybody did his duty, for fraud to go undetected. The shareholder, moreover, receives his balance sheet; and at the yearly or half-yearly meetings he may heckle the Directors to his heart's content over and above the advisory visits with which, in his character of a proprietor, he may worry the Manager in the interim.

Gentlemen, why should we not float Joint Stock Companies in India in large numbers and of various kinds? Organisations for banking, insurance, transportation, trading, mining and manufacturing should be called into existence. Both the theory and the practice of such questions should engage our attention. For instance, Banking is a business of general interest to the community. The number of those interested in it is very large. The holders of shares in Banks are counted by thousands, and hundreds of thousands more are interested as customers; to all of whom the subject is a matter of personal concern. The utility of banking comes home to different classes of the community in very different ways. To those engaged in business, whether that business may take the wider forms of commerce and the larger branches of industry or the narrower limits of retail trade, whether it may be a great railway or a small shop in a back street, a Bank provides a convenient depository at which the trader may leave what spare cash he has till the moment he requires it; and more, a depository whence, if circumstances render it advisable, he may obtain on suitable security an advance which will enable him

to increase his profits and permit him to carry out plans for development which without such assistance, could never have been accomplished. There are Sahukars who deal with money, but these firms carry on small business and command small capital, and their business, as a rule, is confined to a narrow area.

Gentlemen, let me say a few words about insurance. The essential feature of all insurance is that it enables the insured to escape from a position of financial uncertainty into a position of financial certainty. The loss of a vessel, the outbreak of fire, the occurrence of an accident, and premature death are risks which at least in their financial consequences may be guarded against by means of insurance. While individuals may thus be freed from uncertainty, insurance companies, by taking the risk do not place themselves in a risky or uncertain position. The man who buys one ticket in a lottery obtains one chance of winning in return for a certain payment; but the man who buys all the tickets in a lottery eliminates chance, and is sure of winning the prize. This is what is done by insurance companies. By taking a large number of risks they can be certain of experiencing average results and in practically all matters the accumulated experience of the past is a reliable guide to the average experience of the future. Why should we not have our own insurance companies? Why should not every life in the country be insured against risks of sickness, old age and other incapacities common to human and more particular to Indian life? Why should not every family be insured against the risks of death of the bread-winner? Why not every house that human effort brings into existence be assured a permanency by being insured against risks of fire, storms, earthquakes and other accidents? Why not the crop that is reared by the husbandmen be insured against droughts, insects, and other calamities? and so on and so forth. If in England, as we are told, window glasses are insured against breakage, what a nice thing it would be if milk could be insured here against inroads of cats that deprive ourselves and our children from drinking sweet milk on many an occasion! We should solve these problems of various technical subjects.

I pass on to another subject, that is, transportation of goods, which is another question which requires our serious attention. It may concern a rickety bullock cart, or a system of Railway like the B. B. and C. I. Railway, or a system of navigation like the P. and O. Steam Navigation Company. I am not mentioning these institutions as practical probabilities of the near future, but if we study the matter closely, and from the point of view of creating such companies, we shall find that our efforts must be directed on the path of enquiry into the factors that combine to assure success: training ourselves and our co-workers in the art of doing the things properly and so systematising the whole thing that every piece of work that requires to be done is attended to, that everybody who is employed finds sufficient work to do and is put on work that he can do best, and that the work is done punctually and carefully so as the whole field of operations is made best conducive to the attainment of the objects in view with a minimum expenditure of labour.

The export and import trade of India totals up very nearly 250 crores of rupees every year. What amount of employment can be found in the higher branches of this trade in and out of the country, can be properly gauged only by those who are actually engaged in it. I would say it would afford employment to thousands and yield profits of crores. There is ample scope for any number of industries and branches of commerce in India.

THE PRECIOUS STONES OF INDIA.

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I. --DIAMOND.

The first place will be given to diamond not only because it is the most precious of stones, but because it has been known longer in India than in any other country and the most beautiful, famous and many of the largest stones were found here. The rich adornment with this and other precious stones of the oldest temples goes to show that the art of diamond cutting has long been understood. Until the discovery of the Brazilian deposits in 1728, the supply of the whole was derived almost entirely from India.

The diamoniferous sandstone of India is of very wide distribution, all of which belongs to the Vindhyan formation ; the southern diamond districts belong to the lower division, namely, the Karnul series, while the northern districts, e.g., those in Bundelkhand, belong to the upper division of the above-mentioned formation.

The mining of diamonds is still almost entirely in the hands of Indians, and attempts on the part of Europeans to take it away from them, fortunately, seldom been attended with success.

The diamond mines of India have been arranged in the following five (5) groups by C. Ritter, a German mineralogist, in his *Erdkunde von Asien* :—

(1) THE CEDAPAH GROUP.

At the present time the majority of the mines in this group are abandoned, but it does not follow that the supply of diamonds has been completely exhausted. At Chennur, the principal mine in this group, many stones, some of very fine quality, have been found. In two particular cases Rs. 75,000 and Rs. 45,000 were obtained for single specimens. At Wajra Karur was found in 1881 a diamond valued at Rs. 1,80,000. Some of the largest and most famous of Indian diamonds are said to have been found here. Diamonds occur in a very peculiar way at this place : they lie loosely scattered about on the surface of the ground, and there is no definite diamond-bearing bed. This peculiar mode of occurrence has not as yet been satisfactorily explained.

(2) THE NANDIAL GROUP.

This group includes some of the most famous mines ever worked in India, most of which, however, are now abandoned. The most remarkable of these are the Ramulkota mines which are probably identical with the Raolconda mines mentioned by Tavernier, a French traveller and dealer in precious stones. At the time of his visit in 1665, these mines had been worked for 200 years, and were a source of much wealth. Further details are not just now available.

(3) THE GOLCONDA (OR ELLORE) GROUP.

The largest and most beautiful of Indian diamonds were derived from these so-called Golconda mines. They derive their name, not from their situation, but from the fact that the diamonds from these mines were sent to the market held near the old fortress of Golconda.

The richest of the mines to the east of Golconda were those of Kolher discovered about 1560. A 25-carat stone was first accidentally found, and numerous others soon followed, many weighing more than 40. Such famous diamonds as the "Kohinoor," the "Great Moghal," and the "Hope Blue" were probably found here.

From the Partial* mines on the Krishna river is supposed to be derived the "Pitt" or "Regent" Diamond, now in the French Crown jewels.

In the district in which this group is situated, which lies partly in Hyderabad, the "Hyderabad Company"—of course an English company—has acquired working rights and is making immense profit, while we, dormant as we are, are sleeping, or, even if awake, are only fighting for petty clerkships.

(4) THE SAWALPORE GROUP, ON THE MAHANADI.

The whole diamond-bearing stretch of the Mahanadi is about 28 miles long. The most important place is the "Hira Kund," an island 4 miles long, where was found in 1809 a diamond weighing 211 carats. Its subsequent history, however, is unknown. In the Mahanadi, diamonds are associated with pebbles of heryl, topaz, garnet, carnelian, amethyst, and rock-crystal.

The mines of Wairagarh, in the Chanda district of the Central Provinces, though abandoned at present, are likely to become of importance at no distant date, for, though Indians are sitting with their eyes closed, the world at large has them wide open.

(5.) THE PANNA GROUP IN BUNDELKHAND.

Large stones have seldom been found in this district, but the number of smaller diamonds of good quality found now as well as formerly, is considerable.

The mine at Majgoha (Maigama), south-west of Panna, though apparently abandoned at present, is not considered to be exhausted, but is reserved for future working.

With respect to the quality of Indian diamonds, detailed accounts are not available. But, as a general rule, Indian stones rank high in the possession of the most desirable qualities. An Indian stone shows a combination of lustre, purity of water, strength of fire, and perfect "blue-whiteness" of colors, such as is absent from Brazilian and South African stones. Moreover, India can claim for her own all the finely colored stones of blue, green, and red.

I shall now proceed to give a brief history of some of the more famous Indian diamonds. Probably the largest of them is the Great Moghul, the history of which is very obscure. It was seen in the Treasury of Aurangzeb in 1665 by Tavernier. It had the form of a very high and round rosette, and was of good water. It weighed 319 $\frac{1}{2}$ ratis, or 188 carats. The rough stone is supposed to have been found about 1630 in the mines at Kolher, and to have originally weighed 787 $\frac{1}{2}$ carats. The considerable disparity between the weight of the rough stone and its weight when cut, has been attributed to the unskilful manner in which it was cut by Hortensio Borgis, the Venetian diamond cutter, who at that time was domiciled in India. The subsequent history of the Great Moghal is a complete blank; it has been variously supposed to have been lost or destroyed, to be in existence under another name, such as the "Orloff" diamond, or the Kohinoor, to be in the possession of the Shah of Persia, or to be lying forgotten among the jewels of some Indian prince.

Another large diamond of the same weight, namely 320 ratis, is described in the memoirs of Babar. This stone is regarded as being identical with the diamond seen at Delhi by Tavernier, and identical with the stone at present known as the Kohinoor.

In 1813 the Kohinoor was the property of our Ranjit Singh, the Lion of the Panjab, who when asked its price replied, "panch jootian" (पांच जूतीजाँ). In 1850 it was taken to England where it still remains. It has been recut and is now a stone of considerable beauty, weighing 106 $\frac{1}{8}$ carats. It is valued at 15 lakhs of rupees, but, in fact, it is invaluable. It cannot be bought by money and can only be taken by force. The question as to the identity of the Great Moghal with Kohinoor can scarcely be now decided. Tennant regarded them as identical, and suggested that the Kohinoor and the Orloff are both parts of the rough stone of 787 $\frac{1}{2}$ carats, mentioned by Tavernier, and that the third and remaining portion of it is the plate of diamond weighing 132 carats, often mentioned as having been taken by Abbas Mirza with other jewels from Rera Kuli Khan at the capture of Coocha, in Khorassan. Tennant constructed models of these separate portions in fluor-spar, a mineral which has the same octahedral cleavage as diamond, and by piecing the portions together arrived at the conclusion that the rough stone had the size of a hen's egg, the form of a rhombic dodecahedron, and a weight of about 793 $\frac{1}{2}$ carats, which agrees closely with Tavernier's account.

Opinions differ as to the origin of the name Kohinoor which, signifying Mountain of Light is supposed to have been the name given to it by Nadir Shah. It has also been supposed to be a corruption of Kollur, the locality at which it was found, and the name by which it is said to have been formerly known in India.

The "Orloff" is the largest of the diamonds comprised in the Russian Crown Jewels, and usually forms the termination of the imperial sceptre ; it is a stone of the finest water, perfectly pure and with a brilliant lustre. In form it is very similar to that of Tavernier's drawing of the "Great Moghul." This stone has had a chequered career ; it is said to have once formed an eye of an image in a temple on the island of Srirangam, in the Cauvery river near Trichinopoly. It was stolen from there by a French soldier, passed into the hands of an Englishship's captain, and having found its way into Europe was bought in 1791 at Amsterdam by Prince Orloff for the Empress Catharine II of Russia.

The "Moon of the Mountains." This diamond, which weighs 120 carats, became the booty of Nadir Shah, who used it for the adornment of his throne. At his assassination it was stolen by an Afghan soldier, from whom it passed into the hands of an Armenian, named Schafras, who sold it to Catherine II for 450,000 roubles, an annuity of 4,000 roubles and letters of nobility.

"Akbar Shah," so called from its first possessor, when in the possession of Jehangir, had Arabic inscriptions engraved on two of its faces. It subsequently disappeared for a long period, reappearing in Turkey, comparatively recently, and still recognisable as "Akbar Shah" by its Arabic inscriptions. It at first weighed 116 carats, but after recutting in 1866 its weight was reduced to 72 carats and the inscriptions were lost in the process. In 1867 the stone is said to have been sold to the Gaekwar of Baroda for Rs. 5,25,000.

One of the largest of Indian diamonds is the "Nizam," a stone of 277 carats, which is supposed to have been picked up by a child on the ground in the neighbourhood of Golconda. It was originally in the possession of our Nizam, who, it is said, was in a way obliged to send it to England.

A large diamond of singular beauty, perhaps the most perfect of all, is the "Regent" or "Pitt," at present preserved among the French Crown jewels. In its rough condition it was the largest of all Indian diamonds. It was found in 1701 in the Partial (परतिभाल) Mines on the river Krishna, and was bought for Rs. 3,06,000 by Governor Pitt of Fort St. George. In 1717 it was acquired in its rough state by the Duke of Orleans, then Regent of France, for 12 lakhs of rupees. The stone when cut was a brilliant of the most perfect form. In the valuation of the French Crown Jewels, made in 1791, this diamond was valued at (seventy-two) 72 lakhs of rupees. In 1792 it was stolen along with many other crown jewels, but was subsequently recovered, and after being pledged at the time of the Revolution was redeemed by Napoleon. Being an object of general interest, it was not disposed of with the other crown jewels, but has remained up to the present time one of the most beautiful and valuable of the jewels belonging to the French nation.

The "Nassak" diamond so called from its originally being in the temple of Siva at Nassak on the Godlaveri, was till 1818 in the possession of Ranjit Singh's descendants. Its fate, however, has been the same as those of many others, and it is now lying in England in the treasure of the Duke of Westminster.

Thus ends the history of the Indian diamonds, all or almost all of which have left India and carried away with their own brightness, the grandeur of their land. The ancient land of diamonds and of their worthy wearers, Babar, Akbar, Sivaji, and Ranjit Singh, is now a land of darkness and starvation, crumbling to pieces at every moment and sinking down and down, Goodness only knows when to rise again. But if the blood of the departed heroes of Hind still runs in our vein, the day is not far off when the sons of India working with one united effort will accomplish the salvation of their once glorious land.

II.—SAPPHIRE.

One of the important localities is the Sanskar Range in Kashmir. The exact locality was for a long time kept secret from Europeans, but in 1881 it became known and passed into English hands. The valley in which the sapphires are found is 1000 yards long and 400 yards wide, and is about 13 days' journey from Srinagar. From the deposit the gems can be picked out by hand "like potatoes," though they are, of course, also won by washing.

The fine blue colour of the sapphires of this locality first attracted the attention of the inhabitants, who, not knowing their value often used them for striking fire. They were so abundant at first that large numbers were collected by the people and sold to the gem merchants of Simla and Delhi, who, supposing them to be blue quartz or amethyst, purchased them very cheaply.

Numerous dark-brown or green tourmalines are often observed enclosed in, or growing on the surface of, the crystals of sapphire. The crystals are frequently very large, specimens suitable for cutting having been found measuring 5 inches in length and 3 inches in thickness, while some are so much as a foot long.

Sapphires are found in the Hamta Pass in Kulu in the Panjab, as well as at other places.

III.- AQUAMARINE.

Various objects worked in the aquamarine have been found in ancient tombs, temples, &c. Most of them appear to have been obtained in the Coimbatore district, as at Paddur or Patiale. At Kangayam in the same district was found a stone of the most perfect transparency, which weighed 900 carats and sold for Rs. 7,500.

Pale blue crystals of fair size, sometimes measuring as much as 3½ inches in length, are found at many places in the Punjab in granite veins penetrating gneiss. In the Jaipur State aquamarine is mined in the neighbourhood of Toda Rai Singh in the Ajmere district, in the Tonk Hills, and at various other places.

Small crystals of yellow heryl occur imbedded in a thick vein in the Hazaribagh district.

Detailed information regarding other reputed localities is not just now available.

IV.—GARNET.

Garnet is of wide distribution in India. The precious alwandine occurs in such large quantities that it forms an important factor in the

industry of our country. It is collected and cut at many places, especially at Delhi and Jaipur. The stones suitable for cutting as gems are all obtained by excavating and washing the weathered products of gneiss and similar rocks. There are workings of this kind at Kondapalli in the Godavari district. The garnets found here have been derived from a horablendegneiss, and have been long famous. At Bhadrachalam, on the Godaveri river in the Central Provinces, as well as at Mahanadibett, in Orissa, garnets of the same kind are obtained. Stones of better quality come from Gharibpett, eight miles south of Paloncha in Haidarabad.

The garnet mines in Rajputana are a more important source of supply. The mines of Sarwar in the Kishengarh State yield a good supply. Stones from Sarwar are smaller than those from the garnet quarries of Kakoria in the Jaipur State. The quarries of Rajmahal also situated in this State yield garnet, in a less abundant degree though. Garnets are found at Meja in Udaipore, and also at several places in Mewar. Garnet of gem quality is found at many other localities.

V.—TOURMALINE.

The name originated in Ceylon, where *turamali* is the name used by Singhalese jewellers for hyacinth.

Five specimens of blue tourmaline or indicolite (indigolite) are very rare in other parts of the world, but they occur with green tourmaline, lepidolite, and quartz in the granite south of Pahira, near Hazaribagh. The largest crystals found here measure an inch in length; the central portion of the crystals is sometimes indigo-blue and the outer layers green. Blue tourmaline associated with the yellow and brown varieties occurs also with the sapphire of the Sanskar range in Kashmir.

VI.—ROCK-CRYSTAL.

It was, and is still, worked in India in various ways, but the objects now carved and worked in this material do not bear comparison with those of bygone times. The industry is still said to be in operation at Vellum, in the Tanjore district, where brilliants, rosettes, spectacles, lenses, &c., are produced. A once famous centre of this industry is Delhi, the bowls, vases, drinking-cups, and other objects carved there being renowned for beauty of design and skill in workmanship. The art is now forgotten, but the old mines at Aurangpore, fifteen miles south of Delhi, are still to be seen. There are, besides, many other localities in India for rock-crystal.

VII.—QUARTZ-CAT'S-EYE.

The finest quartz-cat's-eye is found in India where it occurs mainly on the Malabar coast. But details are not known. At Ratanpur, in the district of Rajpalia (Bombay), the stone occurs, together with agate, in the form of pebbles, which are undoubtedly derived from the hasaltic rocks—the Deccan traps—of the region. Other localities are in the vicinity of Madras, and in the valley of the Lower Krishna in the neighbourhood of the Palanath mountains.

In Ceylon the stone occurs abundantly.

VIII.—CARNELIAN.

In India blocks of Carnelian, weighing as much as 3 lbs., are found in the Rajpipla hills, at Ratanpur, on the lower Narbada river. The material as it is found in the mines is blackish, olive-green, milk white, or, in fact, almost any colour except red. This tint is acquired after the stone has been heated, the heating being effected partly by a long exposure to the sun's rays and partly by fire. Stones, of which the original color was olive-green, assume an especially fine tint on heating, they are very valuable, and are largely cut in the neighbourhood of Cambay.

Deposits of Carnelian are worked also on the Mahi river, north of Baroda, and the mineral is found at many other places in the volcanic district of Western India, but is not everywhere collected and worked. Moreover, pebbles of Carnelian are found together with jasper and other varieties of chalcedony in almost all the rings. Carnelian, likewise, occurs in the volcanic rocks of the Rajmahal Hills.

IX.—PLASWA AND HELIOTROPE.

A considerable amount of Plaswa is obtained from India. It is especially fine in quality here, and occurs like Carnelian in the volcanic rocks of the Deccan, especially in the district south of the Bhima river in Haidarabad, and as pebbles in the rivers Krishna and Godavari among others.

Heliotrope is also called 'blood stone' from its green colour being spotted, patched, or streaked with a fine blood-red. It is obtained almost exclusively in India, where it occurs with Agate, Carnelian, Plaswa, &c. A famous locality is the district north of Rajkot, where masses weighing as much as 40 lbs. are found. It is also found at Poona. It is also supposed to occur in the Rajmahal Hills, but nothing definite is known. Compared with the Indian occurrence of heliotrope that of Europe is quite insignificant.

X.—AGATE.

The mother-rocks of agate and other varieties of chalcedony are the amygdaloidal rocks or so-called traps of the Deccan Plateau. The crevices and amygdaloidal cavities in these rocks are everywhere filled with agate, carnelian, etc., which are set free by the weathering of the mother-rock and are found loose in the ground or as pebbles in the Godavari, Wardha, Krishna, Bhima, and several other rivers rising in or flowing through the Deccan. In some places the angular or rounded blocks of chalcedony are more or less firmly bound together by a ferruginous cementing material, thus forming extensive and sometimes thick beds of conglomerate, which constitute the main source of the material used for cutting.

The best known deposits are at Ratanpur, from where for more than 2000 years the lapidaries at Broach have obtained their supplies of rough carnelian, agate, &c.

The lapidaries of Banda on the Khan, a tributary of the Jumna, in which a large number of pebbles of chalcedony are found, deserve mention as being once very famous.

The lapidary works which are of the greatest importance at the present day are those at Cambay, from where articles worked with exquisite finish are exported to Europe.

The murrhine vases, famous in ancient times, are said to have come from Ujjain.

Fine dendritic agates are met with as pebbles in Jamuna, and the mineral also occurs in large quantity north of Rajkot and the Kathiawar peninsula, and in the bed of the Majan river. Here are found blocks of spherical, botryoidal, or amygdaloidal form, weighing as much as 40 lbs., as well as rounded pebbles.

XI.—MISCELLANEOUS.

Olivine of gem quality occurs in India, but the locality is not definitely known.

The best crystals of kayainte go to Europe from some unknown localities in India.

Nephrite occurs in the southern part of the Mirzapore district.

Amethyst occurs in India though not in considerable quantities.

Very fine crystals of chrysoprase are exported to Europe, but exactly where they are found does not seem to be known.

Good specimens of Riband-jasper are found in Chutia Nagpore.

Fine specimens of Avanturine are met with in India, but nothing definite is known as to their mode of occurrence or the exact locality. A very pretty green glistening variety from the Bellary district, deserves mention, the scales of mice enclosed in it are of green chromiferous variety known as fuchrite, and the mineral itself occurs in blocks from which slabs of considerable size can be cut.

With a word to our rich and patriotic men I shall conclude. The mining industry is one in which we cannot afford to wait. Once a foreigner gets hold of a mine, all the wealth therein goes away from our country never, never to come again. If we have a bad harvest one year we might have a better one in the next, but the mineral wealth once removed from India can never be recovered. It takes thousands of years before a mineral deposit is formed, and there is nothing like sowing and reaping in the mining industry. Feeling on the point more keenly than I can express, I make an earnest appeal to our monied men to spend even a part of their money in sending Indian youths, to learn mining, to America and Germany. The Japanese Universities are overcrowded, and in England the education imparted is not of a very high order. I sincerely hope that my words will not fall on unwilling ears.

“ Not in vain the distance beckons
Forward, forward let us range.”

APPENDIX III.

Before resolving to hold the First Indian Industrial Conference at Benares, the Executive Committee of the Fifth Indian Industrial and Agricultural Exhibition of the Indian National Congress, under whose auspices it was held, addressed the following circular to about a hundred prominent Indians in the several provinces, with a view to ascertain their views on the matter :—

SIR,—I take the liberty of addressing you in pursuance of the following resolution passed by the Exhibition Committee at a meeting held on the 6th May :—

“ That the opinions of the persons named below be invited on the desirability of holding an Industrial Conference in connection with the Exhibition and as to the lines on which it should be organized if held.”

You are one of those whose opinion is solicited by the Committee on this important matter. It will perhaps make matters clear if I give you a general idea of the scope and purpose of the Industrial Conference which the Committee have in mind.

2. The deplorable poverty of the bulk of our countrymen, aggravated by recent famines and the ravages of the plague, have placed the economic question in the forefront of national problems demanding early solution. The Indian National Congress has from the very beginning recognized its paramount importance, and has held discussions and passed resolutions on this question at every one of its annual sessions. During recent years it has given the subject even greater attention, and placed it in the very front rank of the questions to be considered.

3. The awakening of the nation to the need for industrial activity has manifested itself in the shape of the Industrial Exhibition held in connection with the Congress since 1901. A special feature of the Exhibition held at Bombay last year was the addition of an agricultural side to it. The Congress Reception Committee of Benares have decided to hold the Fifth Exhibition this year, and this Committee are entrusted with the task of organising the same.

4. The Committee recognize that these Exhibitions are excellent, calculated as they are to open the eyes of the people to the present condition of Indian industries and the possibilities of their future development ; but while a knowledge of these is a condition precedent to the beginning of practical effort, the knowledge must be followed by well-considered and well-directed action before it can be turned to advantage. Clear and accurate knowledge as to the directions in which effort should be made for industrial development and the best means of achieving success in those directions should be made available to the people through those who have made a special study

of such subjects. It seems to us that to secure this end, it will be useful to organize an Industrial Conference in connection with this year's Exhibition, at which papers should be read on a few selected subjects, discussions held on the views enunciated therein, and resolutions may be passed embodying the conclusions arrived at by the Conference. With a view to secure the aid and co-operation of all competent men—Anglo-Indian and Indian, official and non-official—without reference to their political opinions, the Committee desire to make the Conference non-political in its character.

5. The selection of subjects and of writers of papers, as well as of persons to be invited to take part in the discussions thereon, the election of a President, the drafting of resolutions to be placed before the Conference, and other matters of procedure and detail, will have to be decided later if the general opinion be in favour of holding such a Conference. The present idea is to definitely settle the subjects and the writers of papers by the end of July.

6. I have the honor now to solicit your opinion on the points brought out in this letter, which are summarised below, and I shall esteem it a favour if you will send in your reply not later than the 20th of June :

- (1) Should an Industrial Conference be held in connection with the Congress Exhibition?
- (2) What subjects should be taken up for consideration thereat?
- (3) Who are the gentlemen—European and Indian, official and non-official—who should be invited to prepare the papers on the subjects that are suggested by you?
- (4) Should the reading of papers be followed by discussions?
- (5) If so, would you suggest the names of those who might be invited to take part in them? and
- (6) Should resolutions be submitted to the Conference on the subjects brought forward?

Any other suggestions that you may be kind enough to offer will, I need hardly say, be gratefully received and considered by the Committee.



I have, &c.,
(Sd.) MADHO LAL,
Chairman of the Exhibition Committee.

The following extracts are taken from some of the replies to the above circular :—

DEWAN BHADUR K. KRISHNASWAMI RAO, C.I.E.,
Madras.

The exhibitions that have been held since 1901, have, no doubt, done good service in showing us what our industrial and agricultural condition and capabilities are. I fully concur with your committee that these exhibitions should be followed up by "well-considered

and well directed action" for our industrial and agricultural improvement. I offer my most hearty congratulations to you and your committee on the conception of this idea which, if carried into effect, will make the exhibitions more business-like.

The Government of India have been recently paying attention to the agricultural improvement of India. The opening of the Pusa Institute and the establishment of demonstration farms in several places, may be taken as an earnest of their benevolent attitude towards agriculture. But in the matter of industrial development, I fear that we should rely more upon ourselves than on Government. What is most necessary is that a number of competent and experienced native gentlemen should form themselves into a standing committee to make a comparative study of various industries with special reference to their financial success and select the most promising of them, to begin with. "One thing at a time" should be their motto. I will have on the committee, intelligent and successful merchants, traders, and artizans, although they may be ignorant of English. They are almost intuitively able to discern what will pay and what will not. It is only those who make a careful observation and study, from day to day, of the manifold aspects and workings of any industry, that would be competent to give practical and sound advice.

There must be a standing committee in every important industrial or commercial centre in India. The Industrial Conference should mainly consist of the members of such committees and of gentlemen who have taken special interest in industrial subjects or who are pioneers of industries or who are carrying on industrial operations. A conference thus constituted will be able to command the respect of the public and secure the attention of Government. I expect no substantial good from an annual gathering, unless it is backed up and supported by standing committees. I know that it is impossible to constitute the *first* Industrial Conference on the lines above sketched. I only wish to emphasise that one of the chief objects of the proposed Conference should be the creation of standing committees who should work *throughout the year* and seek the aid and advice of the Conference on points of difficulty and delicacy, during its annual meeting.

I next proceed to give my opinion on the points mentioned in your letter in their order :—

(1) I think that an Industrial Conference is a desideratum and should be held in connection with the exhibition or even independently of it.

(2) The Conference should consider the following subjects :—(a) Establishment of standing committees in important centres of industrial or commercial activity; (b) the creation of funds for granting scholarships to selected Indian students for prosecuting technical and scientific studies in Europe, America or Japan; (c) the selection of the technical and scientific subjects to be studied, with special reference to Indian needs and requirements and *their financial success*; (d) the best means of utilizing the knowledge and the services of the successful students after their return to India; (e) the nature and extent of the help which the Government should be asked to give

to Indian industries with a view to their protection against foreign competition, and (f) the selection of industries which may be taken up at once and worked.

BABU BOIKUNTHA NATH SEN, *Berhampore*.

1. (a) The poverty of the bulk of our countrymen is no longer a matter of controversy, but is an admitted fact and the development of indigenous works of art and industry has drawn the attention of all who have the good of their country at heart.

(b) The Indian National Congress is avowedly a Political institution. The Social Conferences are held by people whose opinions vary in different matters connected with Social problems. But with regard to the Industrial development no apprehension can be entertained regarding differences of opinion. Official, non-official, Hindu, Mahomedan, Christian, or any one of any other religious persuasion, all must agree as to the necessity for improvement. There may arise differences of opinion regarding the ways and means for achieving success. Industrial Conferences may fairly be expected to be of great use in the adoption of measures and in imparting knowledge which would go to develop our industries. I am, therefore, distinctly in favour of holding an Industrial Conference in connection with the Congress Exhibition.

2. With regard to the selection of subjects our aspirations should for the present be not of a very high character. Capital proportionate to the magnitude of the work would be required for the initial start and for maintenance: but unused to the formation of Joint Stock Companies our countrymen find the greatest difficulty in raising funds and in succeeding in developing the natural resources of our Motherland. Individual efforts, I know by personal experience, are not very encouraging and seldom meet with the desired success. Theoretically speaking, our attention should be devoted to the improvement of those articles which are exported in raw condition and which come back to us as imports after being converted into manufactured goods. Jute, cotton, oilseeds, wool, hide, shellac, quartz sand, kaoline ought to attract the attention of my co-countrymen for the manufacturing of articles which are imported by crores and crores of rupees. Pottery works may be carried on and glass may be successfully manufactured if indigenous quartz sand and kaoline receive a fair share of treatment.

3. European gentlemen connected with European firms, and having liberal views, and European officials in the Financial department should be sought for for advice, and Indian merchants carrying on business respectably, and who have got special knowledge of particular subjects should also be resorted to, and they might be requested to prepare papers on different subjects. In this connection I would also take the liberty to suggest that some Baroda officials connected with the Financial department might very profitably be consulted. I may mention here that while at Bombay during the last Exhibition under the auspices of the I. N. Congress, I met with some Baroda officials and found after some hours' acquaintance and mutual exchange of thoughts that they have collected much information, and they can undoubtedly help by writing out essays on some important subjects.

RAJAH PEARY MOHAN MUKERJI, C. S. I., *Uttarparah.*

Only a few subjects should be taken up for consideration at the Conference; 1st, the appointment of a permanent Committee to make an Industrial survey of the country; 2nd, a provision for the submission of a detailed annual report by such Committee dwelling on the condition and prospects of Indian industries; 3rd, the creation of a fund for the support of decaying industries and the encouragement of new industries.

DEWAN BAHADUR P. RAJARATNAM MUDALIAR, C. I. E.,
Madras.

The question of the economic condition of the people has been discussed by the Congress year after year, and I venture to think that the time has arrived when we ought to be up and doing—doing something practical, something definite, towards the solution of this difficult problem. A few weeks ago I happened to be reading Mr. Edwin A. Pratt's book on "The Organization of Agriculture" in view to prepare a note for the information of the Central Agricultural Committee, which has recently been formed in connection with the Victoria Technical Institute in this Presidency. That excellent book seems to me to give us the key to the solution of the problem.

In the early eighties, most of the countries of Europe suffered from severe agricultural depression which threatened to involve the agricultural population in utter ruin, but they were fortunately saved by the establishment of co-operative agricultural societies. A perusal of Mr. Pratt's book will show how this has been effected. I enclose for the information of those who have not the time to read that excellent work, a copy of extracts that I had made, giving a brief account of the operations carried on by those societies in France, Germany, and Denmark.* It is simply astonishing that a small kingdom like Denmark, a country no bigger in size than the Central Provinces, should, by a system of co-operative societies, have achieved successes which have made her "a power in the commercial world with which other nations have had seriously to reckon."

Let each delegate start a similar co-operative association in his own sphere of influence, and I am sure that our salvation will be ensured. True, there are difficulties in the way. Denmark was a united nation. We are not. But we need not despair. Let the Maharaja of Benares and the Maharajah of Durbhangha come forward and set the example in their own estates, and see how soon it spreads.

DEWAN BAHADUR AMBALAL S. DESAI, *Ahmedabad.*

The principal subjects for consideration may be as follows:—

- i. The indication of the general lines along which industrial activity ought to proceed.
- ii. The selection of industries which ought to be introduced, and can be introduced at once.

- iii. The provision of technical education.
- iv. The specification of subjects which Indian students may, under the present system, study with advantage in foreign countries.
- v. The co-ordination of the efforts of various provinces for the introduction of new industries.
- vi. The promotion of agriculture in all its departments.

It has often struck me that owing to a want of clear perception of the immediate wants of the country, much of our time and resources are wasted as things are managed at present. I think that a conference, such as is proposed, is calculated to do much good in this direction, though it may not have to be held every year.

THE HON. SIR V. C. DESIKACHARI, *Kt., Madras.*

- i. Encouragement to be offered for the revival of the already dying Industries—
 - (a) By opening Emporiums in different parts as a medium to collect and register orders.
 - (b) By making advances to artisans upon orders given.
 - (c) By purchase of such articles in lax seasons, and exposing them for sale on a small profit.
 - (d) By training young men of the artisan classes in improved methods of manufacture.
 - (e) By opening small unpretentious—yet useful—Industrial Schools for training and giving Instruction free.
 - (f) By starting Co-operative Societies for the supply of Indigenous articles and gradually creating a demand for them.
- ii. Starting of new Industries on the same lines on which they are carried on in Europe and America—
 - (a) By establishing in different centres manufacturing factories on moderate scales managed by two or three persons without having recourse to the unsuitable Companies Act.
 - (b) Starting societies—say one for each Province—to collect Funds for maintaining students who go to foreign countries like Japan and America for receiving some kind of technical Education.
 - (c) Starting model factories, not so much to make profit but simply to serve as models or training ground.
 - (d) Establishing Societies purely with the object of collecting information as to—
 - 1st. What raw materials are exported from different countries.
 - 2nd. What use is made of such materials and how are they converted.

(liv)

3rd. What kinds of finished articles are mostly in demand in our country ;

and issuing pamphlets and leaflets containing such information.

(e) Establishing free Libraries.

DEWAN BAHADUR R. RAGOONATH ROW, *Kumbakonam.*

Our industries have been considerably injured by our contact with the people of the West and this circumstance has impoverished our people and multiplied the number of famines in India. Any attempt to compete with the West without the use of machines the Europeans have invented and have been constantly improving is worse than useless. They take a good deal of raw materials from India, and manufacture their goods and sell them cheap in India. If we can retain these raw materials, use them for the production of goods by using machinery, we can beat the Western trade and procure livelihood for our people. To do this we want money and skilled labour. These we have not. We should get our people to learn the use and construction of machinery, not in our colleges here but in manufactures, &c., in Europe. This, again, requires money and enterprise. We are sadly in want of them. So long as the present bureaucratic Government continues, there will be no accumulation of capital in India. In these circumstances what we ought to do, I think, is first to secure capital by co-operative society or societies. To form these successfully we want rich men and patriotic gentlemen. These should work incessantly, intelligently, and economically, to get our men educated in Europe under a covenant, purchase machinery and employ European superintendents to work them till we can get our own people to supply their place. This should be the main object to be secured by the resolutions and actions of the Conference.

Our native mill owners have already effected something, but the owners appear to be actuated merely by the desire to gain good interest on the capital invested ; but this is not sufficient. To this should be added a strong desire to develop our industries in all possible directions for the good of the people in general. I would, therefore, answer the second question thus :—The subjects which should be taken up for consideration should relate to the increase of our industries, to improve what we have, and to utilize cotton, oilseeds, hides, &c., for manufacture in India. One annual three-day Conference will be of no use. There should be a general Conference for the whole of India, having branches all over the country, all working incessantly under the direction of the Head Conference.

K. NATARAJAN, Esq., *Bombay.*

The Conference, in relation to Government, must concern itself chiefly with questions of economic policy. And I, for one, think that the time is come when we ought to demand protection to industries till they are in a position to shift for themselves. I do not believe that the talk of industrial development can lead to much sustained action till protection, in some form, is assured to industries at starting.

As regards the public, the Conference can best serve its object by undertaking the provision, on a small or large scale, of facilities

for the aggregation of capital. The formation of a Bank or Banks, is an object worthy of its aspiration. The small savings of our population are frittered away, owing to ignorance of the value of co-operation. How to prevent this, and how to attract them to the Banks, are subjects which give the widest scope for our energy and ingenuity, informed, as it will be, with a close knowledge of the ways and tendencies of the people.

RAO BĀHADUR M. ADINARAYANA IYAH, *Madras.*

An Industrial Conference is very desirable. The characteristic of most of our indigenous industries is that they are for the most part mere handicrafts, carried on according to rule of thumb, with little exercise of intelligent ingenuity, and with little resort to labour-saving mechanical contrivances. In these remarks I do not refer to the spinning and weaving cotton mills which we have copied from European models. That such handicrafts as still remain to the country can be very much improved, and that industries for the supply and manufacture locally of many of the articles now imported from foreign countries can be created, admits of little doubt if proper steps are taken for the purpose. But for any discussion of the steps to be taken to be a profitable one, I would suggest that the Conference should be one mainly of persons who are directly interested in or connected with the general trading or industrial operations of the country and who from their education and intelligence are capable of taking a sound view of the position of affairs. Merely theoretical and academical discussions will be of little use.

P. L. NAGPURKAR, Esq., *Sholapur.*

The idea of holding an Industrial Conference, *on non-political lines*, so as to allow officials and non officials to participate in its deliberations, is one which meets with our entire approval. Indeed, we need a common platform where the aristocracy of the land can freely mix with the commercial leaders from different parts and work, shoulder to shoulder, in solving the great Industrial problem that faces us all. Experts, in Government service, should be requested to attend the Conference with the local Government's sanction. In fact, co-operation of officials and non-officials, of artizans and other industrialists and of manufacturers and capitalists, is essentially necessary, because, nothing practical can be attempted in the direction of India's Industrial regeneration without the combination of all these. •

2. But great influence and tact are required to bring about such a gathering and we have no doubt that, with men of your stamp and ability at the forefront, your efforts would be completely crowned with success, as were those of the Hon'ble Sir P. M. Mehta, the Hon'ble M. Vithaldas and others, last year, in the matter of the Industrial and Agricultural Exhibition, although its path was at first beset with difficulties.

3. Such Conferences were previously held in Poona for a few years, through the inspiration, and under the guidance of the late Mr. Ranade. Delegates from several parts of the Bombay Presidency, including a few Native States, attended. Papers on industrial questions were read and discussed and the Resolutions which were arrived

at, during the course of the two or three days' sessions, were printed and published for the information of the general public and also of Government. But all this came to a standstill, owing to several causes, the chief of which was, the non-participation therein of the Industrial and Commercial Leaders. Most of those who took the lead in political agitation, had also a considerable share in the organization and up-keep of the Industrial Conference; but the energies of these gentlemen were spent up and a complete collapse was the sad result. No one thinks of reviving that Institution, though more than ten years have elapsed since its cessation. Should your Committee succeed in organizing an Indian Industrial Conference this year, we believe that your example would be usefully copied in the different Provinces of India.

RAO BAHAUDUR G. V. JOSHI, *Satara.*

The idea of holding an Industrial Conference simultaneously with an industrial exhibition is most happily conceived, and I am sure, will meet with the support and sympathy it deserves. The economic question in India is one of vital moment, and the proposed Conference is not called a moment too soon.

Our difficulties in the British Provinces are well known. In the Native States, however, the way is clearer and much can be attempted in the field which seems simply impossible in British territory. So I would suggest that, among others, representatives may be invited from these States—including Dewans and ex-Dewans and administrators. It is here that our hope seems to lie.

Among the subjects for discussion I would give prominence to questions relating to *mining industries*. As you are aware, there has been during the past 25 years an alarming progress in foreign exploitation in the line under special encouragement from the State. We Indians have almost no foot-hold here. We have no mining school in India, and our old mining craft is almost gone. Concessions to foreign exploiters—and their successful operations—represent so much adverse possession of a field which of right is ours. The recent renewal of the gold-mining concessions to a foreign Company in Mysore—the prohibition by executive order of gold washing in Assam—entailing much injustice and hardship on a considerable native population—in favour of English exploiters, etc., these would appear to be simply without justification—and I am one of those who think that we ought not to lose time in asserting our claims in respect of this important branch of our national industries.

G. SUBARMANIA IYER, Esq., *Madras.*

TWO DIRECTIONS IN WHICH OUR ENDEAVOURS SHOULD BE MADE.

There are two directions in which we should pursue our endeavours. How to foster and improve existing industries which for want of sufficient encouragement from the public and from want of knowledge and enterprise on the part of our industrial classes, are in a languishing and moribund condition, should be the first care of the Conference. The second should be, how to organise our capital, train our labour and improve our skill; and by co-operative and patriotic efforts,

undertake new manufacturing industries for which raw materials exist in the country in abundance. As regards the existing industries I may quote the opinion of Mr. Tozer, of the India Office, who recommended that by means of a special industrial census it should be ascertained how many persons are wholly or partially engaged in the various handicrafts, how far such industries were suffering from goods made by modern processes in India or abroad, what measures could be taken to revive them by special instruction or by the introduction of improved appliances ; and what are the earnings and general condition of the artisans. With regard to the weaving classes who number five millions and who constitute full one-third of the whole industrial population, Mr. Tozer thinks "there is need to ascertain what is the best kind of loom for ease and effectiveness of working and what facilities, if any, could be afforded for the purchase of improved appliances by a system of advances." It might be also worth while, he added, to inquire how far electricity could be applied to handlooms in the manner adopted in some industrial centres in Europe. Such an enquiry can only be undertaken by the Government, although with the help of the knowledge obtained by that means, people interested in our industrial well-being might take steps calculated to infuse fresh life into such industries as can be made secure against the effects of foreign competition.

INDUSTRIAL MUSEUMS.

It would be a part of the Swadeshi movement to establish Industrial Museums, where the products of every art and industry in the country might be stored and exposed for public view. Such museums would be connecting links between the producer and the buyer who have now no touch with each other. The producer would know what articles command ready sales, and the buyer would know where and at what prices he could get the articles he wants. Such museums are common institutions in Europe and America. By way of illustrating the nature and objects of these museums I may here quote a detailed description of an "Industrial Technological Museum" which the Federal Government of Mexico recently proposed to establish in the city of Mexico. Its purposes and duties are thus outlined :--

- (1) To collect samples of the minerals, vegetable and animal raw materials which are found in the country to be supplied by their producers or exploiters, together with all the data possible concerning their use, regardless of whether the materials can be employed in domestic or in foreign industries. These samples will be kept on exhibition permanently.
- (2) To place beside each special series of raw materials pictures showing the manufactures to be made therefrom, both in the domestic and foreign markets where they are consumed, and lists of the commission merchants and commercial houses which handle these manufactured products.
- (3) To make geographic charts of the Republic, showing by means of conventional colours, the section of the country, where the various groups of raw materials are cultivated or produced.

(4) To have on exhibition a map of the Republic which shall always be kept up to date, and on which shall be indicated with exactitude the various transportation routes—maritime, river, etc.

(5) To collect data, for the information of the public, relative to the rates of freight from the place of production to any point in the country or abroad, and also the customs duties which the raw materials pay upon importation into any country which consumes them.

(6) To establish in the same quarters a “technological library,” containing the most minutely specialized catalogues, with their prices, of the principal factories of all nations and especially of the manufacturers of the machinery employed in converting the raw materials produced by this country into the best furnished products. This library is to be kept up to date—that is to say, pains will be taken to secure continuously the last editions of every catalogue. The classification to be adopted shall be practical and one admitting of easy consultation.

The museum, says the United States Consul in Mexico, is to furnish applicants, free of charge, with all the data it possesses about prices, places of production, producers, and freight on raw materials and with the data about manufacturers of machinery. Producers or manufacturers can, under certain regulations, place therein samples of catalogues for distribution. The library and services of translation of its catalogues will be free. The museum is to publish and distribute free its own catalogue of the raw materials on exhibition, giving the name of the material, name and address of the producer, place of production, quantity that can be produced, price at the place of production, cost of transportation to the nearest railway station, and the principal uses of the raw material. The co-operation of scientific societies is invited as is that of persons willing to contribute technical studies for publication as special bulletins. The museum will undertake the analysis or technical examination of raw materials, according to agreements made with those desiring this service. It will not, however, undertake commissions between producer and purchasers, only putting them in touch with each other. The plan of putting on exhibition, in connexion with foreign consulates, collections of raw materials, etc., from Mexico, which has recently been inaugurated, will be continued under the direction of this museum, which will also have charge of Mexican exhibits in foreign expositions.

It is not suggested that museums entirely or mostly on the above lines can be established in this country. But they illustrate the type of institutions which can be established here with adaptations and changes suitable to our conditions. Indian industrial museums such as suggested above, will have to be much simpler institutions and to be tried as experiments.

INDUSTRIAL SYNDICATES.

In his recommendation of an inquiry into the present condition and prospects of industries, Mr. Tozer suggested the advisability of making advances to the producer to enable him to meet the output necessary in the making of his articles. So far as his resources go, the Indian artizan is in the same predicament as the cultivator. His poverty often drives him into the hands of the money-lender from

whose clutches he finds it impossible to redeem himself. The profits he is able to make from his work often go towards meeting the demands of his creditor, and little remains to help him in hard times. Besides, on account of his poverty, he is unable to keep the articles he makes for any length of time in his hands, waiting for a favourable time to dispose of them. His need makes it necessary to dispose of them at once ; but costly articles of more than ordinary merit or of special workmanship cannot be sold off at once. He is therefore obliged to make cheap articles which will command prompt sale, or such articles as will satisfy the fancy of foreign tourists and collectors of curiosities who do not care for articles of genuine artistic merit, but only those that will satisfy uninstructed or vulgar curiosity. It is therefore extremely desirable that there should be means at the disposal of the workman to enable him to obtain loans at moderate rates of interest and repayable by easy instalments, and also to dispose of the articles he makes promptly, though for moderate profits. It seems to me that syndicates of capitalists and merchants should be established in different centres, and they should advance small sums to the workmen on the security of the articles to be made, and purchase these articles at prices which will give the producer some reasonable profit. The articles might be stored by the syndicates with a view to sell them when good prices are obtainable. In this manner, the Indian craftsman will be able to ply his occupation without stop or hindrance, and while protecting himself from insolvency, he will command a steady income which will keep him above want and from the grip of the usurer. He will not feel the necessity to pander to the vulgar taste of the foreign tourist and will preserve the excellence of his professional traditions and his own art from deteriorating.

EXHIBITIONS ARE ONLY ADVERTISEMENTS.

The successive Industrial Exhibitions that have been held in different capitals of India have only served as effective advertisements of Indian products, and beyond that they have had no effect. Unless the person that wants or wishes to possess a particular article exhibited, purchases it on the spot or makes a note of where and at what price it can be purchased, there is no chance of the exhibit being remembered and bought. Few are prepared to undergo the inconvenience caused by inquiries, correspondence and so forth. Articles for sale must be under the very nose of the purchaser. It is a great secret of modern trade, that the commodity is exhibited to the public in the most attractive manner possible, and facilities and temptations are provided to catch the purchaser. European importers and their trading agents do exactly the same thing in India, and it is said that British merchants often get driven out of the markets of the world by the superior skill shown by Germans and Americans in duping the purchasers. But in regard to our own indigenous products, the case is entirely different. They are made in remote, obscure villages, and absolutely no means exists by which the general public may know about them and take any interest in them. There is no touch whatever between the producers and the purchasers. No wonder that they languish and die for want of support. There should be some means by which

this want of an intermediary can be supplied—an intermediary which will be in constant contact with the producers as well as with the consumers.

THE INDIAN STORES LIMITED--ITS AIMS AND OBJECTS.

The Company recently established in Calcutta, by name, "The Indian Stores, Limited," will satisfy this important want. The objects at which it aims are :-- (a) To collect chiefly articles of Indian arts, manufacture, and produce and to open show-rooms or shops for the sale of such articles. (b) To establish agencies in any part of India for the sale and purchase of such articles and to do the business of agents generally. (c) To export such articles and to import others and for such purposes to establish, if necessary, agencies outside India. (d) To aid and assist in all possible manner Indian workmen, artisans, manufacturers and craftsmen, with a view to procure articles of Indian art, manufacture and produce suited to the requirements of the country. (e) To establish factories and workshops in connection with the business of the Company. (f) To promote the formation of companies, trusts and combinations and such other public bodies, societies and institutions as may be necessary or expedient for stimulating or regulating the production and increasing the consumption of articles of Indian art, manufacture and produce, in the interest of the Company and that of Indian trade and commerce. (g) And otherwise to encourage, preserve, revive and develop Indian industries, arts and manufactures, with a view to expand the business of the Company and the scope of Indian trade and commerce. It will be seen from the above that though the Company was primarily dominated by patriotic considerations, still it was not proposed to work it on that basis. It is worked on commercial lines, being gradually made not only self-supporting but paying also. The advantage of making a movement of this kind paying is obvious, because, as in other matters, in the matter of disinterested patriotism, of self-sacrifice for the public cause, economy is desirable; and where a movement can be placed on a satisfactory pecuniary basis, it is unwise to guide it on purely philanthropic lines.

APPENDIX IV.

CO-OPERATIVE AGRICULTURAL SOCIETIES.

[The following are the extracts from Mr. Edwin Pratt's "*Organisation of Agriculture*," referred to in Dewan Bahadur P. Rajaratnam Mudaliar's letter printed in Appendix III above.]

During the latter part of the past century, most of the countries of Europe suffered from severe agricultural depression which threatened to involve the agricultural classes in complete ruin. Various economic causes brought about this crisis, but it is sufficient for our purpose to consider only the means adopted to overcome it. Mr. Edwin A. Pratt furnishes us with some interesting information on the point in his excellent work on "The Organisation of Agriculture."

Various schemes were tried by different countries, but the remedy that was finally adopted as the most effective was the formation of agricultural co-operative societies by which the agricultural classes were gradually freed from the clutches of the money-lenders, and were enabled to reduce the cost of production and sell their produce to advantage. The following extracts from Mr. Pratt's book will show how these societies have been organised in some of the countries of Europe and what benefits have been derived from them:—

FRANCE.

In France, the movement began some time in the early eighties. The historian of the movement writes:—"The French market, which, by reason of the development of the means of transport, was no longer protected by the natural barrier of distance, began to be flooded with foreign commodities produced at a cost that defied all competition. Our lands exhausted by centuries of cultivation, had no chance against the productions of virgin soils, or of countries more favourably situated in regard to taxation, cost of labour, &c. The wheat of North America, India and Russia, the wool of Australia and LaPlata, the wines of Spain and Italy, and even the cattle of Italy, Germany and the Argentine Republic, &c., took, little by little, on our markets the place of our home supplies, and the simple threat of their being imported was sufficient to effect a lowering of prices. The national market existed no longer, and on a market which had become universal, and was affected by the slightest fluctuations that reverberated among the great centres of the world, the French cultivator offered an easy prey to the speculations of international commerce."

"These new economic conditions, which there was every reason to regard as permanent, imposed on the agricultural industry a profound evolution."

"It was necessary to organise for the struggle, to realise promptly all the possible opportunities for progress, to decrease the cost of production, and to improve the methods alike of production and of sale. For the attainment of these ends the old agricultural associations were but ill-prepared. It no longer sufficed merely to spread technical knowledge and to give prizes and awards to agriculturists at periodical exhibitions."

This was the critical position in the period referred to above and it was met in an eminently practical way by "a certain M. Tanviray, departmental Professor of Agriculture at Blois." This gentleman found that there was great difficulty in getting the agriculturists to use for their impoverished lands the fertilizers which agricultural chemistry was offering to them; but he saw also that their reluctance was not unnatural. Apart from the ignorance and the prejudices of the farmers in respect to the use of artificial manures, the producers thereof, having to send out travellers and push a business then far from active, charged high prices, and, what was still worse, sent out adulterated or inferior qualities. M. Tanviray's happy inspiration was to get all the farmers in a certain District to join together in sending in one big order, by means of which they would be able to purchase the fertilisers, at a less price, get lower Railway rates, and also, be in a better position to secure a guarantee of quality. A combination with these objects in view was brought about in 1883, and when in March, 1884, organisations of this type acquired a legal status in France many more of such purchase associations followed. The use of the fertilisers was found to yield increased crops at a reduced cost, and the operation of the new Syndicates obviated all the difficulties previously experienced. So the movement for the establishment of agricultural Syndicates spread, in course of time, throughout the whole of France, while in proportion as their utility was more and more recognised, the scope of their activity widened. Seeds and feeding stuffs were purchased in wholesale lots, the same as fertilisers. So were tools and agricultural appliances of various kinds, while special Syndicates either procured agricultural machinery too costly for individual farmers to get for themselves and let it out on hire, or enabled farmers to purchase on special terms.

In these and other ways there was, in the first instance, a direct appeal to the material interests of the agriculturists; and leaders of the new movement had the good fortune to win the early sympathy of the farming community by the offer of practical advantages which prepared for further considerable developments of the combination principle a class of men who, in France, as in England, might well be regarded as the least likely to co-operate for the achievement of a common purpose.

Thus the movement spread rapidly, and in less than twenty years, the number of these Agricultural Associations whose formation had been officially notified up to 1st January, 1903, amounted to 2,433 and the total membership was 599,000. There were also Provincial and Central Syndicates formed for the purpose of influencing public opinion on agricultural questions by means of publications, conferences, &c., and to conduct in general, campaigns by which the views

expressed at the representative gatherings of agriculturists might be carried to a successful issue. From the magnitude of the orders given under this system of combination, the Agricultural Associations secure a three-fold advantage : (1) They get wholesale prices from the manufacturers instead of retail, these prices being made still lower by the fact that the manufacturer, dealing direct with an association or union, incurs less expense for travellers, &c. (2) The quality has to stand the tests of the association's experts, and (3) lower railway rates are obtained because the consignments are sent to Central depots in waggon-load lots instead of small quantities. So the small cultivator who buys a couple of sacks of fertilisers or seed-ing stuffs, through his association, gets just the same advantages in price and railway rates as a large farmer who orders his five or ten tons. These facilities, combined with the skilled advice given free by the associations, have led to a very great increase in the use of fertilisers in France, and many factories have been set up in that country for their production, while a decrease of from 40 to 50 per cent. has been effected in the prices as compared with what they were before the advent of the agricultural associations.

Besides the associations formed to promote the interests of agriculturists in general, there are many which apply to special industries such as the Syndicate formed at Rennes by a group of cider-makers, with others organised by market gardeners, nurserymen, the growers of vines, beet-root, tobacco and medical plants, bee-keepers, &c. Such organizations seek to promote the general interests of the industries concerned by means alike of spreading technical information, grouping purchase of necessities, facilitating the sale of products, or making joint representation, in case of need, on the subject of market tolls, railway rates, &c.

GERMANY.

Turning to Germany, it is observed that at the time of general depression, the agriculturists there had the advantage of a system of protective tariffs which gave them a greater chance of preserving their own considerable home markets for themselves, than was the case with agriculturists in free-trade England. The German agriculturists also enjoyed exceptional advantages under the thorough-going system of agricultural instruction which had been established in the country for several years past, and from the discoveries of agricultural chemistry in regard not only to the application of artificial manures, but to the use of agricultural products in various industries, such as the use of beet-root for the manufacture of sugar, of potatoes for the production of a spirit used for driving motors and engines, for lighting, heating, cooking, &c. No fewer than 14,000,000 tons of beet-root, representing a value of £12,000,000 ate used in Germany in the course of a year in the manufacture of sugar, and the production of these supplies for an industry that is the direct outcome of scientific research is a valuable set-off against possible depression in other branches of agriculture. Still more remarkable is the production of potatoes which amounted to a total of 48,500,000 tons in 1901, of which about one-half is used for other purposes than human consumption, viz., for distillation purposes, manufacture of starch syrup, starch sugar, feeding of cattle, &c. Notwithstanding these advantages,

however, the agriculturists found themselves placed in a difficult position in the time of their depression. Science could tell the farmer what it would pay him best to produce and how to secure big crops ; but it left him to his own resources in the way of raising money and of selling his crops to the best advantage. Falling prices and other adverse circumstances had so far decreased the available funds of the farmer that it was difficult enough for many of them to carry on their ordinary operations in their ordinary way, year by year, without embarking on those wider undertakings or those more costly methods which agricultural science was opening out to them. In these conditions, it often enough became a matter of urgent importance to the farmer that he should raise a loan which would enable him to carry on until he obtained a return from his crops. Such a loan might make all the difference between comparative success and absolute failure. But while the ordinary banks were ready enough to advance money to a landowner who could give them a mortgage on his estates, they were reluctant to make advances to individual farmers on nothing but their personal security, and their reluctance increased in exact proportion to the growing needs of those who wished to borrow. The way out of the difficulty was found by a resort to the co-operative credit Bank system under which the joint credit of the whole of the members of an association is used for the purpose of borrowing money. Once the possibilities of co-operation were fully recognized, these credit Banks spread rapidly and they were soon followed by special agricultural societies for the purchase of artificial manures, feeding stuffs, machinery, tools, coals, &c., which aggregated over 1,000. Of production and selling societies (representing among other branches, societies for the sale of seed, fruit, vegetables, and produce of all kinds ; selling societies, the German spirit syndicate and societies for the sale of cattle), there are 669. Of dairy produce societies, there are 1,682. There are also co-operative societies for drainage and irrigation and especially for the purpose of reclaiming bogs and moorlands. The extent of land so reclaimed between 1878 and 1890 is estimated at over 700,000 acres and much of this land on which nothing but heath had grown before now ranks as among the most productive soil in the Empire. In regard to the use of machinery, it is stated that steam threshing machines are used on no fewer than 35,000 farms of less than five acres each. Without co-operation, such a thing would be altogether impossible. In some instances the farmers of a particular district will organise a society for the purchase of a steam-plough, letting it out on hire to their neighbours when they are not using it themselves. It is stated that the number of registered agricultural co-operative societies on 1st July, 1903, was no less than 17,162, and some idea of the enormous benefit conferred upon the people by these societies will be formed when it is realised that in 1902, the total amount of the purchases of agricultural necessities effected by the German credit banks or by the special associations for the purpose was alone valued at $3\frac{1}{2}$ million pounds.

What, therefore, with her very practical and comprehensive system of agricultural education, her elaborate development of an easy and most effective agricultural credit, and finally, her great variety of agricultural co-operative associations, Germany may well

claim to have reorganised the position of the cultivators of her soil in a way that has brought to them a measure of success, and to herself a degree of economic advantage, that would have been impossible, if, when they were threatened with agricultural depression, they had clung tenaciously to old ideas and antiquated methods.

DENMARK.

But it is in the little Kingdom of Denmark, that the farmer will find the most impressive object lessons as to the benefits to be derived from agricultural co-operation. After the Napoleonic Wars, and later on, the disastrous wars with Prussia and Austria, when Denmark lost two of the fairest and most fertile of her provinces, she was reduced to the narrow limits of the islands, and Jutland, and even of this area, a considerable portion consisted of moor, marsh, and dune land, practically unfit for cultivation. On the top of all this came the fall in the price of corn which led to a severe agricultural depression which left the people in a most deplorable condition. But the country fought against adversity with the courage of a giant, and crippled though she was, she not only regained her strength but became a power in the commercial world with which other nations have had seriously to reckon. It was in the development of the dairy industry that the Danes mainly found the means of recovering from the crisis which had overtaken them. Originally the butter exported from Denmark came from what were little more than blending mills, the supplies produced by the individual farmers and representing a variety of qualities and different degrees of freshness, being bought up and mixed together with results that were not always satisfactory to the purchaser, while the expense to which each farmer was put in producing his own particular lot of butter left, as a rule, a very small margin for profit. Then there was adopted the system of creameries to which the farmers would take their cream only. This represented a distinct advance as it effected a saving alike of time and of cost to the farmer; but the greatest degree of progress began with the perfection of the centrifugal cream separator which left the farmer to do no more than send his milk to the butter factory, where the cream was taken from it by the separator, and the skim milk given back to him for the feeding of his pigs.

In other ways, the researches of the learned professors had placed the working of the industry, on a more scientific basis, thus facilitating operation, reducing expenses, and allowing of far better and much more profitable results being obtained than had been the case before. Then also, the spread of an extremely practical scheme of national education and especially agricultural education, had prepared the people to take advantage of the coming transformation, while the system of land tenure in Denmark which had done so much to encourage both the creation of agricultural free-holders and the increase of small holdings, and further strengthened the power of the agricultural community to benefit from the opportunities opening out to them.

The immediate and striking outcome of these various conditions was a resort to co-operative dairies, so that the agricultural classes could get a maximum of possible benefit for themselves. The first

co-operative dairy in Denmark was opened in West Jutland in 1882. Others followed, and to such an extent has the movement spread that at the present time, a co-operative dairy is to be found in almost every parish, and there are now no fewer than 1,050 of such dairies in Denmark, with 148,000 members, owning 750,000 cows out of a total 1,067,000 milch cows in the country. In 1902, this little state exported, mainly to Great Britain, 168,000,000 lbs. of butter, 135,000,000 lbs. of this total representing home produce and the remaining 33,000,000 lbs. butter received from Sweden and Russia. The total value of the imports of butter from Denmark into Great Britain in 1902 was £9,302,000. The practice usually adopted is for about 150 farmers in a particular district to raise, say, £1,200 by subscribing £8 each, this sum being sufficient to provide a dairy which will deal with the milk of 850 cows.

The establishment of the co-operative dairies has been followed by the founding of societies for the sale of butter together with some 200 central unions which employ capable men--to take periodical tests on the milk on the farms of the members, and see which particular cows gave the best results according to the quantity and cost of food consumed.

[*Note.*-- The Indian farmer, even if he does not go in at once for co-operative dairy society, might at least take some useful lessons from his Danish brethren in sending pure milk and pure butter to the market, by which he is certain to earn a larger profit than he can by adulterating his articles.]

Next to the co-operative creameries, and now, indeed, rivalling them in importance, come the Danish co-operative bacon-curing factories, the success of which has been, if possible, even more rapid. It is stated that these factories were the outcome of political prejudices, but whatever the cause, the success of the movement was almost phenomenal. The first co-operative factory was started in 1888, when the number of pigs killed for curing was 23,407, valued at £57,000. By 1902, the number of these factories had risen to 27 with a total membership of 65,800, while the number of pigs killed for curing amounted to 777,232 and their value to £2,500,000. In the organisation of these co-operative factories, no capital is subscribed by the farmers whose joint guarantees are sufficient to enable them to secure from the banking institutions of the country the loan they may require to defray the cost of construction and to provide the working capital as well, the loan being repaid out of the profits of the business. The members also guarantee to supply to the factories all the pigs they raise on their farms, a fine of 10s. 3d. per pig being imposed in case of non-compliance. On sending his pigs, the farmer is paid a certain sum, representing less than the value, but subsequently he receives a share of the profits according to the number of animals he has supplied.

Another highly successful branch of co-operative agriculture in Denmark is represented by the Egg industry. Here the chief organisation is that of the Dansk Andels Aeg-export which was founded in 1895, and now constitutes the central body of a large number of local societies in all parts of Denmark. The members of these societies pledge themselves to deliver none but freshly-laid

eggs, all that are sent in being so marked that the farmer supplying any single one of them can be readily traced, while a penalty of 5s. 6d. is imposed for every bad egg received after a warning has been given. The local societies remit the eggs to the central organisation which arranges for grading, packing and sale and fixes the price per lb. to be given to the farmer less the cost of collection and other expenses.

Membership of the local societies is generally obtained in return for an entrance fee of six-pence. So profitable has the business become that the Danes send their own eggs to Great Britain and import eggs from Russia for home consumption, the difference between the price they get for the former and the amount they pay for the latter representing by the end of the year a fairly substantial sum.

Among the many other farms of co-operative organisation in Denmark an important role is filled by the association formed for the supply of agricultural necessities, seeds, feeding-stuffs, manures, machinery, &c.,—at the lowest price and in the best condition. Here again the local societies are formed in turn into large federations. The ramifications of this co-operative purchase system extend to practically every parish in Denmark.

Again, the growth of the Egg industry has given rise to numerous poultry societies for the improvement of fowls. Some of these societies have a membership of from 2,000 to 3,000 persons. They receive grants from the Government, and their operations are greatly facilitated by experts who devote their time to delivering lectures or giving personal advice to the farmers.

There are also local Bee-keepers' Associations, for making honey. They number about sixty with a membership of 5,000.

Thus there is hardly any branch of agricultural industry in Denmark which is not represented by its separate co-operative organisation. As a rule, each particular co-operative society works on independent lines, for its own special object, so that one farmer may be a member of many different organisations, according to the particular branches of agriculture in which he is interested. The system has been so successfully established in the country that a few years ago, the Department of Agriculture and Technical Instruction in Ireland thought it necessary to send a deputation of members to enquire and report on co-operative agriculture and rural conditions in Denmark, and the results of the enquiry are published in a report which was issued in the autumn of 1903.

The rapid development of this co-operative effort in Denmark has brought about changes in the economic conditions of the country that have been almost revolutionary in their character. Not only has it effectually checked the serious consequences that seemed to be impending as the combined result of agricultural depression and national disaster, but the general position of Denmark to-day is one of greater prosperity than ever, for the Danes are deriving more advantage from the extremely limited amount of soil they now possess than they got from the land before the dimensions of their country were so seriously curtailed.

APPENDIX V.

SOME SUGGESTIONS.

To—THE PRESIDENT, INDIAN INDUSTRIAL CONFERENCE.

Benares City, 26th December, 1905.

SIR.—I regret I shall be unavoidably absent from the sittings of the Conference, and I beg to place my suggestions in your hand.

The Congress Exhibition must be a necessary adjunct of the Industrial Conference and should be worked on well-organised principles. The Exhibition should not only advertise itself and leave the rest to be done by the industrial public, but I believe the Exhibition Committee should have a complete organisation with a small working sub-committee in every district of India, and regular and sustained efforts should be made to represent all the industries of India at the Exhibition. The lessons of each Exhibition should be taken up by the Central Committee and inculcated throughout through the sub-committees.

The object of the Conference should be first of all an industrial survey of India and the forming of a detailed programme of industrial activities. For this purpose, the whole country should be divided into centres. Each centre should be in charge of a committee, which should report itself to the Conference every year. So far as Bihar is concerned, it should form a centre by itself, and I am prepared to serve as a member of the Bihar sub-committee. As for the industries that may be undertaken in Bihar, I suggest the following:—

(1) *Weaving industry—both power-loom and hand-loom.*—The hand-loom industry has been already undertaken in right earnest. But there is room for power-loom industry, with special advantages. Chittagong Hill Tracts and Saran (including Champaran) are the greatest cotton growing districts in the whole of Bengal. The ordinary Garo Hill variety of cotton, indigenous in Chittagong, is not suitable for weaving. Chapra cotton is much better and is long stapled. Labour is abundant in Saran and is exported to the tea districts. I consider Saran is one of the best places for enterprise in power-loom weaving industry.

(2) *Aloe fibre.*—The aloe or agave plants are abundant in Bihar. The Raikon aloe fibre is exhibited at the Congress Exhibition. The fibre exhibited at Sonepur by the Darbhanga jail was not inferior to what I found at the Benares Exhibition.

(3) *Glass-making.*—Professor Ramsay examined the specimens of sand sent to him from Patna and he considered them to be well suited for glass-making.

(4) *Paper Mill.*—Babu Gurmukh Rai, an enterprising Marwari of Patna city, collected statistics for starting a paper mill industry in Patna, about which he was very hopeful, but for lack of capital, he could not undertake it.

In conclusion, I have to suggest that the Conference should do all it can to raise capital for the weaving industry or some other industry wherever it meets. It would be setting a good example if a large capital be raised at Benares in the first year of its existence. I am told that Messrs. Baghmal Badridas of this city are willing to pay 2 lakhs towards weaving mill industry. This may be made the nucleus for raising a capital of ten lakhs from Benares city. Benares has the largest weaving population, and weaving industries may be at once organised here.

I have, &c.,

PURNENDU NARAYAN SINHA.

To—THE PRESIDENT AND DELEGATES,

INDUSTRIAL CONFERENCE, BENARES.

DEAR SIRS, Will you kindly bring the following suggestions prominently to the notice of the Industrial Exhibition Committee :—

(1). It is a very happy sign of the times that the educated classes of India have begun to realize the necessity of reviving old industries and starting new ones. But apart from capital and skilled labour, the principal difficulty that threatens any new enterprise is the want of a guaranteed market or permanent custom on which to rely for the sale of articles produced. This difficulty can only be removed, by securing the sympathy and co-operation of wholesale merchants. The bulk of the import trade of foreign articles, is to-day in the hands of a few Bora or Mahomedan merchants at the principal ports like Bombay, Madras, Karachi and Calcutta. These merchants are not at all in touch either with the Congress or the Industrial Exhibition, and the consequence is that, though a native factory may offer them country-made articles equal in quality and cheaper in rates as compared with foreign goods, still they are not inclined to encourage their sale. It is, therefore, suggested that as soon as the sessions of the Congress are over, the Managing Committee of the Industrial Exhibition should select, out of the numerous exhibits, such articles of daily requirements as can compete in quality and prices with foreign products, and approach the wholesale merchants of the place through some of their educated leaders, with definite proposals and prevail upon them to enter into an agreement to purchase those articles up to a certain limit every year. This would in my opinion be a very practical step, without which no amount of lecturing on industrial questions or awarding prizes for good exhibits will have any permanent effect. As retail sale cannot be depended upon, it is always necessary to secure the co-operation of wholesale dealers before starting a new industry.

(2). In several towns in India, Depots have been opened for the collection and sale of Indian stores. To render these Depots as complete as possible, it is necessary to compile something like a directory of Indian arts and industries containing the names and full addresses of the mills and factories and of the manufacturers or supplying agents of various articles. This directory should be a complete guide to the manufactures and natural products (vegetable and mineral) of India, and should contain also statistical information on important arts and industries. In America, they have got the Peck's Buyers' Index to the manufactures and products of the U. S. A. I have been for sometime thinking of compiling such a directory and have already collected 1,500 names, but I find, from practical experience, that it is very hard to approach the individual manufacturers who never advertise their wares, nor care to read newspapers, in case appeals are made to them through the Press to communicate their own names as well as the names of the articles produced. To meet this inconvenience, I would suggest that the proceedings of each year's Industrial Exhibition be published together with a complete list of the exhibits, as well as the addresses and names of the manufacturers or senders of those articles. If this suggestion be accepted, there will be within four or five years, a reliable record of the raw materials as well as manufactures of the various provinces in India.

(3). At every session of the Congress, appeals should be made for funds for the purpose of sending out promising students to foreign countries to learn a particular art or industry which may be fixed upon by the Industrial Committee. The surpluses that may remain after defraying the expenses of the Exhibitions should be utilized for this or similar other purpose. It is reported that the Ahmedabad Industrial Committee has got a balance of about Rs. 12,000 and much controversy is going on regarding the way of its disposal. I would take this opportunity of suggesting that the money may be used in sending a few deserving students to Japan or any other foreign country.

(4). There has arisen a desire amongst the educated classes to purchase cloth of Indian manufacture, and it is high time that the leaders of the Congress movement should themselves set an example in this matter, which will surely have a far-reaching consequence in further advancing the mill industry of India. Why should not our leaders forget the behests of fashion and false taste and set an example by appearing in this national assembly in dresses of country-made cloth?

(5). Secondly, it is also necessary to collect the trade-marks and names of all weaving mills in India. If the facsimiles of these trade-marks be printed in pamphlet form, these pamphlets will be a very reliable guide to distinguish foreign from country-made cloth because trade-marks in themselves are very misleading. The names of Indian importers are sometimes stamped on foreign cloth, to give them the appearance of Indian-made, while Indian manufacturers wish that their cloth should pass off as foreign-made. This difficulty can also be solved easily if all the manufacturers make it a point to stamp their goods with the words "Indian-made."

(6). In the principal cities of India, societies should be started pledging themselves to patronise Indian-made cloth and other articles.

(7). There is also the necessity of opening Depots all over India for the collection and sale of country-made articles. This will be a very useful opening to enterprising educated men.

I have made the above suggestions to my countrymen in the hope that they will prove acceptable.

SANGAMNER, DISTRICT AHMEDNAGAR,
BOMBAY PRESIDENCY.

11th November, 1905.)

Yours faithfully,

M. B. SANT.

I.—A committee to be formed to collect information on the following points :—

- (a) (1) The articles manufactured in different parts of India.
- (2) The speciality of these articles, their prices and other details.
- (3) Any deficiencies and how to remove them, i. e., how the articles can be improved.
- (4) Whether there is a Railway station where these articles are manufactured, if not, the name of the nearest Railway station.
- (5) The names and addresses of reliable dealers who deal in those articles.
- (6) If possible, the names and addresses of the manufacturers and makers themselves and their specialities.

(Collect a few specimens of all articles.)

- (b) (1) The places where machines are at work, their names and addresses.
- (2) How these machines are worked, whether there is any deficiency or shortcoming and how to remove it.
- (3) Whether the articles produced by them are sufficient for the requirements of the country or it is necessary to have new machines to fulfil the requirements.

(Collect a few specimens of these machine-made articles.)

- (c) (1) What sort of factories, mills, &c., can be started in India.
- (2) What places are suitable for their establishment.
- (3) Full estimates of cost of working and starting such factories or mills, and the amount of capital required.
- (4) Estimate of income or profit on them.
- (5) From where such machines can be purchased, with full names and addresses of their makers or manufacturers.

II.—An office or show room to be established in Calcutta, Bombay or elsewhere where all specimens or models could be had and where full information could be gathered and all enquiries could be attended to fully.

III.—A detailed and full report of the above to be published. If the work cannot be finished within one year, it may be continued regularly. A report of the work accomplished in the year to be published by the end of the year so as to give an idea of the work done.

III.—For this work good able persons may be appointed on suitable salaries, and given travelling allowance as well. They should see everything with their own eyes to make their report.

IV.—All savings of the Congress and Industrial Exhibition to be devoted for the accomplishment of the above proposal and also special subscriptions to be raised.

WARPING.

BY CHOTALAL RAM SINGH.

Here is a piece of news of some interest to our people at this time.

In May last, one Mr. Gharpure, a graduate of the University of Bombay and an assistant master in the Sholapur High School, started as an amateur a small weaving establishment. Shortly afterwards he was joined by his son-in-law. At first they used the common country hand-loom. In June, however, some Parsi gentleman suggested that they might try some such machine as the American fly-shuttle loom, lately exhibited by the American Mission at Bombay. The idea was taken up; and in their efforts to construct some machine according to the description given the gentlemen have fortunately lighted upon what may be called a genuine indigenous invention. The "भराटी" as they have named their new machine is a fly-shuttle hand-loom in which the shuttle is worked by the reed itself as in the case of the American loom but on quite a different mechanical principle. The भराटी is very simple in construction and free from all complications. It consists only of straight bars of wood, put together by simple joints and fixed by screws or nails; and is little likely to get out of order; and if it ever does so, it can be repaired by any ordinary country carpenter. It accomplishes about 120 strokes of the shuttle in one minute through 52" warp—that is only about 20 strokes less than the looms in the Mills. The भराटी has already been put to work and the gentlemen have for some days past been weaving with it. The cost of the भराटी with teak wood frame comes to about Rs. 35.

APPENDIX VI.

LETTERS OF SYMPATHY.

C. E.

No. 6863

GOVERNMENT OF INDIA.

DEPARTMENT OF COMMERCE AND INDUSTRY.

Calcutta, the 24th November, 1905.

FROM—W. L. HARVEY, Esq., C. I. E., I. C. S.,

SECRETARY TO THE GOVERNMENT OF INDIA,

To—THE SECRETARY, INDIAN INDUSTRIAL CONFERENCE, BENARES.

SIR,—I have the honour to acknowledge the receipt of your letter of the 13th instant, in which you ask me to forward a note on the work of the Commerce and Industry Department to be read at your meeting in December next. The Conference will, I trust, be a successful one and may do much useful work if any practical suggestion for the encouragement of indigenous industries be put forward. While I regret that I am unable to comply with your kind invitation to send a paper, I shall watch the proceedings of the Conference with interest and shall be glad to put before Government any information they may wish to give on the subject of industrial improvement or any measures they may indicate as likely to have a practical result in this direction.

I have, &c.,

W. L. HARVEY,

Secretary to the Government of India.

LAIDLAWSTIEL, GALASHIELS, N. B. •

14th November, 1905.

DEAR SIR,—I am very glad to hear that an Industrial Conference is to be held in Benares in December. I hope it may lead to an Industrial Survey of India and to the further promotion of technical instruction. For the proper development of the vast resources of India and the prosperity of those engaged in industrial and commercial pursuits as well as in agriculture systematic training is an imperative necessity, and I am sure that the Central and Local Governments are fully alive to the need of organisation.

Your faithfully,

(Lord) REAY.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION, DUBLIN.

30th November, 1905.

DEAR SIR,—I am desired by Sir Horace Plunkett to say that he has received your letter of the 30th ultimo, in which he was much interested.

He regrets that owing to his being run down in health through over-work, and under medical treatment, it is impossible for him to reply personally to your communication. He asks me, however, to express his sincere thanks for the kind wishes which you have been good enough to convey to him, and for your too generous appreciation of his work in Ireland.

He wishes every success to the proceedings of the First Indian Industrial Conference, and hopes that it will be the means of giving a valuable stimulus to the important industrial and social movements in India, which in many respects are closely analogous to the similar movements in this country.

As he has not yet had the privilege of visiting India, he fears he could hardly give any hints which would be of use to those who, like yourself, are on the spot, and intimately acquainted with the local conditions. He will always be interested in hearing how those who are working for the improvement of social and economic conditions in India are solving the difficult problem of administering State Aid without weakening the action of the principle of self-help. If the proceedings of the coming Industrial Conference are to be published, he would be much obliged by your kindly having a copy forwarded to him.

He is having sent to you by this mail a copy of some publications of this Department and of the Irish Agricultural Organisation Society (this latter body representing the self-help side of the Irish movement) which he thinks may be of interest to you and your co-workers. Should you wish for any further information, he will gladly have you supplied.

I am,

Yours faithfully,

HERBERT S. SMITH,

Private Secretary.

4, KING'S WOOD ROAD,
UPPER NORWOOD, LONDON, S. E.
19th November, 1905.

DEAR FRIEND,—Your note of 29th ultimo this moment to hand. I am sure I wish you and your committee all success in the praiseworthy work you have in hand, and I hope and pray that it will, if persevered in for some years, bear fruit that will bring about some amelioration in the condition of the masses in India. One must not expect miracles, but I really believe that in this undertaking there is a distinct promise of good for India in the not distant future. . . .

You and all who are working in *this* and *every* line for India's good, have my entire sympathy. Little may seem to come of all these efforts at the outset; but good, honest, *unselfish* work for the good of others is never thrown away, but even as time sweeps along (often long after the doers have been forgotten) sooner or later brings forth new alleviations of suffering or new blessings for mankind.

I remain,

Yours ever very sincerely,

A. O. HUME.

22, KENNINGTON ROAD,

LONDON, S. E.

1st December, 1905.

DEAR CHINTAMANI,—I have received your kind letter of 15th October last.

I am very glad indeed that a separate Industrial Congress is now to be commenced and under such good auspices that our friend, Mr. R. C. Dutt, is to be the President, and such competent gentlemen, as our friends, Mr. G. V. Joshi, Mr. R. N. Mudholkar and Mr. G. Subramania Iyer, are to take part in it. Now three distinct Congresses—Political, Social, and Industrial—being formed, each will do its own work well, and the joint result will be most beneficial to India.

The Industrial Congress composed of practical business men, with efficient Central organisation, and Branch organisations all over India will be of incalculable value.

Giving all the three Congresses my best hopes and wishes—and with kind regards to all friends.

Yours sincerely,

DADABHAI NAOROJI.

CARLETON, PRINCES PARK, LIVERPOOL.

28th November, 1905. .

DEAR SIR,—In reply to your letter I wish God-speed to your Industrial Conference. India will never be prosperous till it gets industrial development and it must not object to foreign capital and skill coming on to aid this movement. Agriculture also is very backward and much more must be done in the way of irrigation and improved methods of husbandry. I understand the Government is starting model farms in the various districts. This is important. I have propounded a plan to clear the ryots of debt—their condition in many provinces is almost hopeless. I enclose you some copies of my last speech in the House of Commons dealing with this subject; also some copies of a pamphlet I published this year, containing some letters bearing on industrial questions. I have discussed those

questions with Mr. Gokhale who has been well received by our leading statesmen.

You have my hearty good wishes for the prosperity of India and for the success of your Congress.

Believe me,

Yours truly,

SAMUEL SMITH.

48, SACKVILLE STREET, MANCHESTER

7th December, 1905.

DEAR SIR.—On my return from London to-day I received your letter of 13th November, inviting me to send you an article dealing with the industrial situation in India to be read before the coming Industrial Conference at Benares on the 27th of this month.

I thank you, and through you the Committee, for your kind expressions of confidence in my ability to furnish you with an useful and instructive memorandum. But I find that unless I post it by mail leaving to-night, it will not reach Benares in time for the meeting. Without time and thought I could not prepare a paper worthy of so great and important an occasion, and I must therefore regretfully abandon the opportunity.

Wishing the Conference every success, and with kind regards to all members of your Committee,

I am,

Yours very truly,

F. FORBES ADAM.

LEEK,

23rd November, 1905.

DEAR SIR.—I duly received your letter of the 31st October, and I think the best way of complying with your request is to send you a copy of my book on Kashmir Sericulture, from which you will be able to obtain all the information you require.

I am very glad to say that the Weaving Branch which I have introduced there, and which is now at work with 200 looms, promises to be a very great success. The silk cloths which are being woven there are quite equal, if not superior, to the same class woven in China and Japan and also compete favourably in price. There is every prospect of its being a very large and important industry and has the obvious advantage of the production of textile work from silk actually produced on the spot.

Believe me,

Yours very truly,

THOMAS WARDLE.

(CAMP) TELlicherry,
30th October, 1905.

MY DEAR SIR.—I feel honoured by the invitation from your committee to contribute to the Industrial Conference, a brief paper on some subject bearing on the Indian Industrial problem.

I shall have much pleasure in endeavouring to comply with the invitation, but I cannot promise because I am not sure whether I shall succeed in writing anything that may be worthy of the occasion or useful to the public. For one thing I am engaged, by desire of the Madras Government, in an enquiry into the great fishing industry of the presidency, in view to attempting its improvement and development so as to provide more food, work, and manure for the country: this absorbs all my time and energy and involves incessant travelling in out of the way places. Hence an initial difficulty in preparing a paper for the Conference.

Kindly let me know approximately the desired length of the paper, and the latest date on which it should reach you.

I look forward with much interest to the approaching Conference and the action which will arise out of it, having paid much attention to the industrial problem and having spent good deal of money in practical attempts in certain directions.

Believe me,
Yours sincerely,
F. A. NICHOLSON.

COCHIN,
10th December, 1905.

DEAR SIR,—I regret that I have been unable to put together anything worth sending to the Conference on the subjects mentioned in your letter. You will, however, have abundance of material for discussion without my adding my own mite. I shall look forward to reading the full proceedings which will, I presume, be published at an early date.

Yours sincerely,
F. A. NICHOLSON.

November 15th, 1905.

DEAR SIR,—I am in receipt of your letter of the 25th October and deeply sympathize with your efforts to produce industrial life in India. At present I am travelling from place to place and shall not get access to my papers before the first week in December. There will still be time then I hope for me to write a short note on co-operative credit as you desire, and if there is, I will certainly do so. In any case I thank you for asking me and trust that you will have a successful meeting leading to practical issues.

Yours faithfully,
F. S. P. LELY.

December 5, 1905.

DEAR SIR,—In continuation of my last letter to you I have the pleasure to send you a brief note on the Agricultural Co-operation question. It is, of course, a mere bird's eye view, but it may at any rate serve as an expression of my interest in your aims and hope that you will have a successful and profitable conference.

Yours faithfully,
F. S. P. LELY.

SERLE'S GARDENS, ADYAR, MADRAS.

25th December, 1905.

DEAR SIR,—Your kind invitation of the 16th instant has only just reached me. I much regret that official duties prevent my being able to accept it, as I should have been delighted to attend the sittings of the Conference, which I trust will tend to stimulate the economic development of the country.

Believe me,
Yours faithfully,
A. E. CASTLESTUART STUART.
(*Member, Board of Revenue.*)

6, PIAZZA SAVONAROLA, FIRENZE.

November 19th, 1905.

DEAR SIR,—I have just received your letter of October 19th regarding the proposed Indian Industrial Conference, and regret that, owing to my absence in Europe on furlough, I am not in a position to assist you in any way. I should be glad to receive later a copy of your Report on the proceedings of the Conference.

Yours faithfully,
R. E. ENTHOVEN, I.C.S.

GEOLOGICAL SURVEY OFFICE,

Calcutta, November 27th, 1905.

DEAR SIR,—I shall be very glad to assist the object of your Industrial Conference as far as my limited spare time will permit, and I consequently accept with much pleasure your invitation to contribute a note on the mineral resources and industries of India. If possible, I will attend the Conference myself in order to assist in answering any questions, or in giving information, which may be of practical value to the members. You will understand, I hope, that if I find it in the end impossible to visit Benares whilst the Conference is on, it will be merely because my work is more than I can get through, and that I shall certainly endeavour to attend.

Yours sincerely,
T. H. HOLLAND.

7th November, 1905.

The objects of the Conference have had my greatest sympathy for years, and I hope that the meetings will be successful, and that lasting effects will ensue.

Yours faithfully,

R. BURN. (I.C.S.)

(*Editor, Imperial Gazetteer of India.*)

20th December, 1905.

MY DEAR SIR,—I am sorry that I am prevented from visiting what seems likely to prove the best Exhibition that has been held in India. I was particularly anxious to study the collection of improved agricultural implements and hand-looms, and metal works in view to see what improved appliances might be introduced with advantage into this Province. As I have already informed you, we have started a Central Agricultural Committee, in connection with the Victoria Technical Institute, and the Trustees of Pachaiyappas Mudaliar and Cheungalvaraya Naicker's charities (of whom I happen to be one) have recently established a Technical and Industrial Institute. In connection with both these Institutions, I was desirous of obtaining as much useful information as I could by spending some days in your Exhibition.

I trust that the organizers of this grand Exhibition will establish a museum for preserving the best exhibits and products of our indigenous manufactures and industries, to serve as models for introducing into other parts of the Empire.

Your truly,

P. RAJARATNAM MUDALIAR.

(*Late Inspector-General of Registration, Madras.*)

BANK OF CALCUTTA, LIMITED.

Calcutta, 3rd November, 1905.

DEAR SIR,—I am in receipt of your letter of the 30th ultimo, addressed to Mr. David Yule, and as that gentleman is at present in England, it is doubtful whether he will return in time for the meeting of your Conference. I very much regret he will be unable to send you the note on the industrial development of India to be read at your approaching meeting. However, speaking for Mr. Yule I can say that having regard to the unceasing interest he takes and has taken in the development of Indian industries, and particularly those which would help to the advancement of Indians, it will be a source of disappointment to him not to have had the opportunity of giving your Conference the benefit of his wide experience. I am sending your letter to Mr. Yule by the out-going Mail. In conclusion both on behalf of Mr. Yule and myself I wish your Conference every possible success.

Yours faithfully,

D. KING,

Managing Director..

[Besides the above, letters expressing sympathy with the objects of the Conference and wishing it success were received from Mr. S. H. Butler, C. I. E., I. C. S., Secretary to Government, United Provinces ; Mr. Edgar Thurston, Superintendent, Government Museum, Madras ; Mr. John Adam, Barrister-at-Law, Crown Prosecutor, Madras ; the Honourable Mr. S. M. Moses, Bombay ; the Rev. Foss Westcott, Cawnpore ; Mr. C. A. Radice, I. C. S., Commissioner of Hazaribagh ; Mr. W. R. Gourlay, I. C. S., Registrar of Co-operative Credit Societies, Bengal ; Mr. John E. Mackenzie, Principal, Victoria Jubilee Technical Institute, Bombay ; Sir George Arbuthnot, Kt., Madras ; Mr. P. H. Swinchatt, Head Master, Government Industrial School, Lucknow ; Mr. C. Benson, Deputy Director of Agriculture, Madras ; Mr. John S. Dawson, Acting Principal, Victoria Jubilee Technical Institute, Bombay ; and several other eminent men.]

APPENDIX VII.

LIST OF DELEGATES TO THE INDUSTRIAL CONFERENCE.

The gentlemen, named below, were elected as delegates to the First Indian Industrial Conference :—

1. *By the Committee of the National Fund, Calcutta* :—Rai Parvati Shankar Chaudhuri, the Hon'ble Babu Nolin Behari Sircar, C. I. E., the Hon'ble Mr. J. Chaudhuri, M. A., Bar-at-Law, Kaviraj Upendra Nath Sen, Kumar Rajendra Nath Mukerji, Mr. A. H. Ghaznavi, Bar-at-Law, Babu Provas Chandra Mitter, M. A., B. L., Babu Silendra Nath Datta.
2. *By the Mahajana Sabha, Madras* :—Messrs. G. Subramania Iyer, B. A., V. Krishnaswami Iyer, B. A., B. L., T. Rangacbariar, B. A., B. L., G. Venkataranga Row, M. A., N. C. Rajagopalachari, G. A. Natesan, B. A., C. Sankaran Nair, B. A., B. L., C. I. E., V. S. Srinivasa Sastri, B. A., L. T., K. B. Ramanadha Iyer, M. A., B. L., L. T., P. Lakshmi Narasu Naidu, B. A., S. Venkatachariar, B. A., B. L., C. Vijayaraghavachariar, B. A., the Hon'ble Mr. L. A. Govindaraghava Iyer, B. A., B. L., the Hon'ble Mr. M. Krishnan Nair, B. A., B. L., Mr. M. Govindan Nair, B. A., B. L., Mr. A. C. Parthasaradhi Naidu, Mr. V. Ryru Nambiar, B. A., B. L., Mr. C. R. Tiruvenkatachariar, B. A., B. L., Mr. C. V. Krishnaswami Iyer, B. A., B. L., Mr. T. V. Gopalaswami Mudaliar, B. A., B. L., Mr. K. Narayana Row, B. A., B. L., Mr. G. Subbarao.
3. *By a Public Meeting held at Cucnpoore* :—Babu B. N. Sen, Babu R. C. Chatterji, Babu Gopal Chandra Banerji, Sayyid Muhammad Hashim.
4. *By a Public Meeting held at Bellary* :—The Hon'ble Mr. K. Venkata Row, Messrs. H. Lakshmana Row, P. Siva Rao, T. Somasandara Rao, A. A. Sabhapati Mudaliar, J. Pilla Reddi.
5. *By the Kayastha Sudar Sabha Hind, Lucknow* :—Babu Fateh Bahadur Nigam, Vakil, High Court, Lucknow, M. Radhey Behari Lall Nigam, Vakil, Rae Bareli, M. Munnu Lall, Rais, Cawnpore, Babu Debi Prasada, Vakil, Cawnpore.
6. *By the Landholders' Association, Madras* :—Mr. G. Venkataramarao, M. A.
7. *By the Saraswat Samiti, Mymensingh* :—Babus Akshaya Kumar Mazumdar, M. A., B. L., Puresh Chandra Lahiri, Pleader, Judge's Court, Kulada Charan Munshi, M. A., B. L.

8. *By the Sujan Samaj, Benares* :—The Hon'ble Munshi Madho Lal, Dr. Sri Krishna Barman, Babu Abhaya Charan Sanyal, M. A., Mahamahopadhyaya Pandit Adityaram Bhattacharya, M. A., Babu Indra Narayan Singh, M. A., the Rev. E. Greaves, Mr. A. C. Mukerji, B.A., Babu Kali Das Mitra, Pandit Chhannulal Joshi, Lala Jagdeo Prasad Gour, Rai Siva Prasad, Babu Joogal Kishore, Babu Durga Prasad, B. A., Pandit Baij Nath Misra, B. A., Babu Bhagawati Prasad, B. A., Babu Madho Prasad, Rai Bahadur Munshi Raghunandan Prasad, Babu Ram Krishna Varma, Pandit Ram Narayan Misra, B. A., Babu Ram Prasad Chowdhuri, Pandit Ramawatar Pande, M. A., Babu Sita Ram, B. A., Babu Hari Prasad Palodhi, B. A., Babu Hari Kesav Sanyal, B. A., Babu Sarada Charan Chakravarti, B. A., Babu Syam Sundar Das, B. A., Babu Lakshmi Das, B. A., Pandit Ramchandra Rao Naik Kalia, Dr. Ganesh Prasad, M. A., Dr. D. D. Pandya, D. P. H., Babu Kalka Prasad, Babu Badri Prasad Khatri, Mr. C. Y. Chintamani, Rai Bahadur Dr. Sripat Sahai, Dr. Ishan Chandra Roy Chowdhry, Dr. Jogendra Prasad Sanyal, Babu Ananda Kumar Chowdhry, Babu Kedar Nath Ghose.
9. *By the District People's Association, Madura* :—Mr. G. Srinivasa Rao, B.A., Mr. L. K. Tulsiram, B. A., B. L., Mr. D. Lakshman Bhagavathar.
10. *By the Indian Art School, Calcutta* :—Pandit C. L. Sharma, Babu Jnanendra Nath Das, M. A., B. L., Editor, *Samaya*, Kaviraj A. C. Bisharad, Babu Behari Lal Chakravarti, Editor, *Pradip*, Babu Manmatha Nath Chakravarti, Principal, Indian Art School, Babu Gopi Kanta Sen, Manager, Indian Art School, Babu B. N. Dutta.
11. *By a Public Meeting held at Baranagore* :—Rai Yatindra Nath Chowdhury, M. A., B. L., Zemindar, Babu Kedar Nath Mukerji, Babu Fani Bhusan Deb, the Hon'ble Babu Jogendra Nath Mukerji, M. A., B. L., Babu Lalit Mohan Ghosal.
12. *By the Stradesi Hitaisini Sabha and the artisans of Bishnupur* :—Babu Haridas Bhattacharya, Head Master, Bishnupur High English School.
13. *By the Bengal National Chamber of Commerce, Calcutta* :—The Hon'ble Babu Nolin Behari Sircar, C. I. E., Babu Radha Raman Kar, Babu Nibaran Chandra Dutta, Babu Muralidhar Ray.
14. *By a Public Meeting held at Bankipore* :—Babu Purnendu Narayan Sinha, M. A., B. L., Government Pleader and Zemindar; Babu Gajadhar Prasad, Pleader and Zemindar, Municipal Commissioner and Member, District Board; Babu Ram Gopal Singh Chowdhry, B. L., Pleader and Zemindar; Babu Kali Kumar Sinha, B. L., Pleader and Zemindar; Babu Krishna Sahay, B. L., Pleader and Zemindar; Babu Manmatha Nath Dey, B. L.; Babu Gopalji Sahay, Banker; Babu Alakh Kumar Sinha, B. A.; Babu Brij Nandan Singh, B. L.; Babu Nilambar Prasad, Pleader.

15. *By the Dawn Society, Calcutta* :—Babu Kishory Mohan Das Gupta, M. A.
16. *By the Rifah-i-Am Association, Lucknow* :—Babu Ram Chandra, M. A., Vakil ; Mirza Samiulla Beg, B. A., LL.B., Vakil ; Syed Wazir Hasan, B. A., LL.B., Vakil ; Pandit Gokaran Nath Misra, M. A. LL. B., Vakil ; Babu Bisheshwar Nath B. A., LL.B., Pandit Sukhdina Bihari Lall, B. A., LL.B., Vakil ; Babu Ganga Prasad Varma ; A. P. Sen, Esq., Bar at-Law.
17. *By the Council of the Dev Samaj, Lahore* :—Shriman Mohan Dev, Editor, Sindh Upkarak, Dr. Parashram, Medical Practitioner.
18. *By the Central Agricultural Committee, Madras* :—The Hon'ble Mr. L. A. Govindaraghava Iyer, B. A., B. L.
20. *By the Landholders' Association, Bhagalpur* :—Babu Uma Gouri Bose, Gouri Prasad Misser, Shital Prasad Misser, Sante Lal Misser, Chandra Kishore Chowdhuri, Surendra Nath Bose, Charu Chandra Bose, Surendra Nath Mukerji, Akshaya Kumar Chatterji, Sharada Prasad Mukerji, Kshetra Nath Ghosal, Harendra Nath Bagchi, Manmatha Nath Banerji, Satish Chandra Singha, Shastri Bhushan Singha.
21. *By the Swadesi Vastu Paracharini Sabha, Bombay* :—Professor Nilkanth Babaji Ranade, B. A., Mr. Prabhakar Govind Vaidya, Banker, Mr. Ganesh Laxman Page, Mr. Mahadeo Gopal Vaze.
22. *By the Industrial Club, Ahmedabad* :—Mr. L. Nagardas, Mr. Chunilal N. Bhat, Mr. Keshavlal Manasukhram, Mr. I. C. Kanishver, Mr. S. M. Maharaja.
23. *By the United Provinces Graduates' Association, Allahabad* :—Babu Ramananda Chatterji, M.A., Dr. Tej Bahadur Sapru, M. A., LL.D., Babu Devendra Nath Ohdedar, B. A., LL.B.
24. *By the North Arcot District Association, Chittoor* :—The Hon'ble Mr. L. A. Govindaraghava Iyer, B. A., B. L., Mr. N. Krishnamachariar, B. A., Mr. V. C. Seshachariar, Mr. T. K. Narasimhachariar, B. A., B. L.
25. *By a Public Meeting held at Cocanada* :—Messrs. Pydah Venkatachalam, P. Ramarazu, G. Subbarayudu, B. A., D. J. Devalrazu.
26. *By the District Association, Vizagapatam* :—The Hon'ble Mr. B. N. Sarma, B. A., B. L. Mr. D. V. Narasinga Row, B. A., B. L., Mr. V. Jagannadham, B. A., B. L., Mr. V. Purnaiya, B. A., B. L., Mr. O. V. Jagannadha Sastri.
27. *By a Public Meeting held at Barakur* :—Babu Satish Chandra Dutta.
28. *By the Bengal Landholders' Association, Calcutta* :—S. R. Das, Esq., Bar-at-Law.

[The President of the Madras Chamber of Commerce, the Secretary of the Karachi Chamber of Commerce, and the Secretary of the Behar Landholders' Association wrote letters expressing sympathy with the objects of the Conference, and regretting their inability to send delegates to it.]

APPENDIX VIII.

SPEECHES AT THE OPENING CEREMONY OF THE INDUSTRIAL AND AGRICULTURAL EXHIBITION AT BENARES.

THE HON'BLE MUNSHI MADHO LAL'S SPEECH.

Your Highness and Gentlemen,—As Chairman of the Exhibition Committee, it is my privilege to open the proceedings of this meeting and my duty to give you a brief account of our work during the year. I tender to you all a hearty welcome to this interesting function, which has been made possible only by the generous support of the public. It is in my opinion a sign of the times that even a backward city like Benares has been able to organize an Exhibition on the scale of the present one. This is the first instance of such an Exhibition being held here so far as my recollection carries me. In saying this I do not forget, ladies and gentlemen, an Exhibition held here many years ago which I myself witnessed; but that was a purely local affair and a comparatively easy one to finance and to manage, whereas our present Exhibition is what its name implies—an Indian Exhibition; Indian not only in that it has been organised entirely by our countrymen, but Indian in the representative character of the exhibitors and the exhibits. As you are aware, ladies and gentlemen, the Indian National Congress has, during the last four years, associated with itself an Exhibition of the products, arts and industries of this country, and this Exhibition is the fifth of its kind. The excellent movement was inaugurated by our Bengali brethren, who have of late added to their public achievements a zealous effort to foster indigenous industries, and it has been taken up with avidity by enterprising Ahmedabad, practical Madras, and always progressive Bombay. That backward Benares should also have caught the contagion is to my mind full of significance. That, not resting content with following in the wake of the other cities named above, Benares should inaugurate an Industrial Conference is further eloquent proof, if one were needed, that the educated Indian is determined to do what in him may lie, to bring about the development of Indian industries. I will not, however, anticipate the function of Saturday week by any lengthy reference to this latest child of the Indian National Congress.

Your Highness, the essential point to be borne in mind in respect of the Exhibition which will presently have the honour of being opened under your august auspices, is in my opinion that it is a middle-class movement. Herein lies its principal significance. That the educated classes, who are obliged to give their first attention to their own bread-winning occupations and who are not as a rule very rich in the possessions of this world, should be able to do so much, is a practical demonstration that they are thoroughly alive to the need of what our present Lieutenant-Governor, whose absence to-day I am sure we all regret, has called industrial self-help. It proves that when they

appeal for State aid in any matter of national importance, they do so, less because of their unwillingness to work out their own salvation than on account of the impossibility of achieving great results without the active support of the State. I venture to invite the attention of high State dignitaries to this view of the matter, and hazard the prediction that no broad-minded official of the Government who studies our Exhibition with sympathy and insight will care to deny the truth of my statement. Gentlemen, I have said that this is essentially a middle-class movement. On that very account it must appeal to your indulgence. In this country it is the sad fact that organisations which are not started under the auspices or with the active countenance of Government and which have to depend on the uncertain support of public subscriptions, can at best be imperfect successes. Your Highness can with difficulty form an adequate conception of the innumerable difficulties which a middle-class movement like our Exhibition has to contend against. When His Excellency the late Viceroy, a generous admirer of Indian art, conceived the idea which bore such rich fruit in the delightful Exhibition which it was the good fortune of some of us to witness at Delhi two years ago, he had only to allot a few lakhs out of State revenues and to depute experts like Sir George Watt to carry his project to a successful completion. Again, when their Highnesses the Nizam of Hyderabad and the Maharajah of Mysore decided that the Royal visit to their capitals would best be celebrated by the holding of exhibitions of the products, arts and industries of their States, nothing more troublesome was necessary than the deputation of a few of their high-placed officers to carry out the task with the aid of munificent sums placed at their disposal. We, your Highness, are less fortunately circumstanced. While we are nothing but sincerely grateful to those Maharajahs and Rajahs who have helped us with munificent donations, it is the humble mite of the poorer middle class which has been our chief support. And if the best effort of which we have shown ourselves capable has been less than the minimum necessary to lead us to success, I may still venture to hope that a visit to our Exhibition will not be altogether useless and that those who do us that honour will not feel that we have laboured in vain.

Gentlemen, enthusiastic as our countrymen are in the efforts to develop manufacturing industries, we have all to recognise the hard realities of the situation and must admit that for long years to come, if not for ever, agriculture is bound to remain the principal occupation of the bulk of our countrymen. And he is the truest saviour of the famishing millions of this impoverished land whose efforts will make two blades of grass grow where only one grows now. Wrote Sir James Caird many years ago:—'I believe it possible to obtain such a gradual increase of production in India as would meet the present rate of increase of population for a considerable time. One bushel of increase gained gradually in a period of ten years, in addition to a moderate reclamation of cultivable land, would meet the demand of the present growth of population.' This statement is as true to-day as when it was made; and the aim of the re-organised and improved Agricultural Departments of the Supreme and Provincial Governments, of the Provincial and District Agricultural Associations which are being formed in several provinces, as well as of the Agricultural Exhibitions

and Cattle Shows which have become a regular feature of the day, is to bring about the result insisted on by Sir James Caird and other eminent experts. Bearing this well in mind, and convinced as we are that the future of Indian industries is safe only if the means of our agricultural population will be so increased as to enable them to make even moderate purchases of articles of utility as well as luxury, we of the Benares Committee have from the outset attached great importance to the Agricultural Section which was added to the Congress Exhibition last year at Bombay. True it is that the actual achievement bears no proportion to the wished for result, and that even what has been done was only possible because of the assistance rendered to the Committee by Mr. S. M. Hadi, the capable Assistant Director of Agriculture who has been deputed by the Provincial Government to show off the exhibits of his own department. There is, however, one special feature of the Agricultural Section which deserves to be brought prominently to the public notice. I refer to the demonstration of the improved processes of Sugar refining which is in charge of Mr. Hadi. It is generally known that while the Sugar industry first took root in this ancient country and that even so late as three quarters of a century ago, India was exporting large quantities of Sugar to foreign lands after meeting the full demands of its own population, our countrymen are at present obliged to consume nearly six crores of rupees worth of foreign Sugar. Nothing can be more lamentable, and any effort made in the direction of rehabilitating this considerable industry demands complete public support. Besides, as is generally known, these Provinces are the centre of the Sugar refining industry, and consequently a special responsibility rests on us to do whatever is possible to restore the old conditions. Mr. Hadi has devised improved processes of Sugar refining, and it may be assumed that their general adoption will go a long way towards making Sugar refining an important industry once again. Of course this will be the case only if our capitalists invest in the industry. I venture to appeal to them not to hesitate to do so as they will in all probability get a good return on their outlay, besides generally closing the Indian market to the foreign sugar producer. Before concluding my remarks on this, I will with your permission tender my thanks to Sir William Wedderburn, that never tiring friend of India, for sending for exhibition here samples of some foreign agricultural products.

Your Highness, I will now address myself generally to the Industrial section of the Exhibition. I have said that agriculture is and must remain the principal industry of India unto the distant future. It is hardly less true that its material prosperity does largely depend on the development of manufacturing industries. It is as much the case to-day as when it was written by the Famine Commissioners nearly thirty years ago, that "at the root of much of the poverty of the people of India and the risks to which they are exposed in seasons of scarcity lies the unfortunate circumstance that agriculture forms almost the sole occupation of the mass of the people, and that no remedy for present evils can be complete which does not include introduction of a diversity of occupation through which the surplus population may be drawn from agricultural pursuits and led to earn the means of subsistence in manufactures and some such employment. A main cause of the disastrous consequences of Indian famines and one of the greatest difficulties in the way of promoting relief in an

effectual shape, is to be found in the fact that the great mass of the people directly depend upon agriculture, and that there is no other industry from which any considerable part of the population derives its support." Between agriculture and urban manufacturing industries are the old village industries which furnish occupation to many a poor soul and whose gradual destruction is one of the most tragic of Indian economic phenomena. Cultivation and labour, and after these Sugar making and weaving, these are the chief occupations of the mass of our population. I have already emphasised the paramount importance of paying increased attention to the Sugar refining industry. In so far as the working of large factories by the use of power goes, it is for the capitalist class to do the needful. But there is improved refining process by hand mechanism as well, and it will be very beneficial if this could be popularised and brought within the reach of our village folk. Then we have the weaving industry, which is not only a secondary occupation for the agricultural classes but is the primary means of livelihood of several million people. These men are unfortunately not in the best of circumstances, and it is notorious that they cannot stand the first touch of scarcity. After the agricultural labourers they stand most in need of relief wherever the seasonal rains fail. Any steps taken to set them on their legs again, would not only solve the problem of their poverty but will be the means of producing enough cloth for all the people of the country. This can best be done by devising improved handlooms which will produce more cloth in less time than is the case at present. It may be quite true that powerloom mills will have to be established in larger numbers if we are destined eventually to do without foreign cloth, but opinion is by no means unanimous that that way lies our salvation. Indeed, I am not sure that experts have not made up their minds in favour of the hand mechanism as best suited to the conditions of this country. Let this be as it may, there is an urgent reason for doing all that is possible to develop the village weaving industry. It is my experience as a landlord that it is best suited to the conditions of Indian life to make every village, in which lives the nation, as self-contained as possible. Apart from the social perils incidental to factory labour, it is imperative for more reasons than one that our old village industries should be revived wherever possible and not allowed to die a painless death, and these remarks hold equally true of other industries such as pottery, vessel making, cane work and so on. For these reasons the Exhibition Committee has deemed it its duty to bestow prominent attention on the handloom business, the more so because of recent events which have given so encouraging a stimulus to the demand for country-made goods. Early in our work we put ourselves in communication with such men as Mr. E. B. Havell, Mr. S. P. Kelkar, and Mr. Alfred Chatterton, while we have received particularly useful assistance from Rao Bahadur Raoji Bhai Patel, Director of Industries and Agriculture in Baroda, whom I am glad to see here to-day. A Handloom Court has been organized and the weavers deputed from the Technical School of Baroda are there to demonstrate the working of nearly every improved loom now before the public. I am confident that no one who visits this court will go away without being amply rewarded. Another special feature of the Industrial section, to which I may usefully invite your attention, is the

demonstration in lace-making that will be given by girls from the same enlightened state, who have been specially called here at the instance of our eminent countryman, Mr. R. C. Dutt. Our ladies, who are so fond of wearing lace and who find some little difficulty in satisfying their wish as they have an increasing desire to wear only articles made in this country, will, I dare say, be delighted to know that Baroda will come to their aid. To the gentlemen named here, and the Hon'ble Mr. Vithaldas Damodher Thackersey, whose genius for organisation found such splendid scope in the wholly successful Exhibition held last year at Bombay, and to Mr. D. V. Hanumantha Row, Secretary of the last Madrass Congress Exhibition, I gladly tender my grateful thanks for the help they have rendered us.

I do not propose to take up your time, ladies and gentlemen, by lengthy references to the other sections of our Exhibition. There is the Arts Section, there is the Health Section and there is the new Educational Section, to all which I invite a visit from you. True it is, none is more conscious of it than I am, that there is a good deal left to be desired in our organization. But I feel that the Committee has not totally failed in its work when I contemplate the practical good that is likely to result from the demonstration of the Sugar refining processes and of the working of the improved handlooms. I cannot bring these remarks to a close without tendering the grateful thanks of the Committee and myself to all who have assisted us with their helpful counsel or rendered us material support. Few can know how much we are indebted to our sympathetic Commissioner, Mr. D. C. Baillie, our amiable Collector, Mr. E. H. Radice, to Mr. Bramley, the Superintendent of Police, and to the Military authorities of Benares, of whom gratitude compels me to make special mention of Colonel Bowring. It is the literal truth that it would have been impossible to organize this Exhibition or the other grand function which will be held in the next few days, without their sympathy and assistance. It is not possible to make a personal reference to every one who has been of help to the Committee, as there are so many of them, but I would ask all these volunteer workers to believe that we are sincerely thankful to them.

I now request Your Highness, to whom we are all so grateful for becoming the patron of this Exhibition and for presiding at this opening ceremony, to declare the Exhibition open.

H. H. THE MAHARAJAH OF BENARES' SPEECH.

It is a great pleasure to me to come to open this Exhibition, and I must thank the members of the Executive Committee for having invited me to do so. It affords me an opportunity of meeting such a large gathering of my distinguished countrymen who have taken all the trouble to come to our holy city from different and distant parts of the country, among other things, to appreciate and encourage local industry and manufacture.

I will not traverse the ground covered by my Hon'ble friend, the Chairman of the Exhibition Committee in the interesting speech to which, I am sure, we have listened with close attention in attempting

to give you an idea of the aim and the scope of the exhibition. I would rather content myself with a few general remarks pertinent to the occasion. The organisation of these annual Exhibitions by successive Reception Committees of the Indian National Congress is proof of the determination of the educated middle class of India to wipe away the somewhat just reproach that they pay excessive attention to political agitation and have no adequate conception of industrial development as a factor in national regeneration. If I am right in thinking so, I take leave to congratulate them on this recent development of their programme. Believing as I do that the first need of my native land is the working up of its rich natural resources, I am naturally pleased at the earnest effort that the intellectual aristocracy of the country have begun to put forth to compass this end.

I do not propose to dwell at any length on the splendid past or the brilliant possibilities of Indian industry. It is enough for us to know that it is the considered opinion of so high an authority as Sir Guilford L. Molesworth —

" That India possesses enormous natural wealth and resources, Agricultural, Mineral, or Industrial, but they are to a great extent undeveloped. Her coal-fields so far as they have been explored cover an area of 35,000 square miles and are estimated to contain 200,000,000,000,000 tons of coal! Some of the seams are 70 to 100 feet thick. In Bengal and Assam there is coal nearly equal in evaporative power to medium Welsh Steam-Coal though inferior to Aberdare. In some parts of India the supply of Iron ore is on a scale of extraordinary and unparalleled magnitude, whole hills and ranges of it being of the purest variety. There is chrome-iron capable of making the finest Damascus blades, manganeseiferous ore, magnesite, splendid Hematites in profusion, Peat, Petroleum, Gold, Silver, Aluminium, Lead, Tin, Copper, Plumbago, Lime, Magnesia, Mica, Gypsum, Salt, Soda, and Asbestos. There are immense forests of valuable timber. There are food grains of every description, soft wheat equal to the finest Australian, hard wheat rivaling the best Kabanka, Oilseeds, Rubber, Tobacco, Tea, Coffee, Cocoa, Sugar, Spices, Dyes, Cotton, Jute, Hemp, Flax, Coir and fibre of every description—in fact, products too numerous to mention."

The development of this potential wealth can only be the result of a combination of capital, skill and labour, of the joint effort of the State and the people. I have no doubt that the Government have done much and will do all that lies in their power to further this end, provided we approach them in a practical way showing them what we have done and what we want them to do for us. By the way, I might suggest that we ask them to render support to Indian captains of industry, to help in the establishment of co-operative industrial banks in our towns with a view to the better organisation of indigenous capital, to establish a Polytechnic Institute at some suitable centre in the country, and above all to institute an industrial survey of India which those competent to pronounce an opinion have declared to be a condition precedent to the introduction of an organised system of technical education in the several provinces. At the same time I would urge my own countrymen to sedulously cultivate a living interest in industrial problems, to employ their capital and talent in wealth-production instead of wealth-consumption, to learn the

essential virtues of self-help, self-respect, mutual confidence and co-operation, to exhibit less of anti-foreign bias and more of a real desire to profit by the lessons which the industrial West has to teach us. In this connection it is perhaps permissible for me to express my sense of cordial approval of the action of the Benares Exhibition Committee in inaugurating the Industrial Conference movement from which I expect great things if persistently worked by capable men.

Turning now to the Agricultural problem, I would take leave to remark that the Government in the last few years have done so much towards the improvement of the agriculture of this country that with a little co-operation from the people themselves the prosperity of the agricultural class ought to be practically assured. The gigantic irrigation programme which the Government has taken in hand at the recommendation of the Irrigation Commission will, when completed, serve to mitigate the evils of the scanty rainfall so far as lies in the power of any human agency to fight against fate. The improvements effected in the veterinary department, the easy rules framed for the grant of loans for agricultural purposes, the elastic elements introduced into the system of the land revenue, the liberal remissions and suspensions sanctioned in times of scarcity, the valuable concessions made to the Credit Societies, and above all the establishment of an institution for agricultural research with an Agricultural College in prospect, ought to make the lot of any agricultural community as happy, and its future as bright as possible.

If our peasantry determine to curtail their marriage and funeral expenses, which is at the root of their chronic indebtedness, give their children some elementary education at the village schools, which a kind Government has placed at their doors, and thus save them from the clutches of the village Patwari ; cultivate the habit of saving, and instead of burying it deep in the ground, invest it in safe undertakings ; give up the notions of fatalism and be active and doing ; while attached to their ancestral home cultivate the habit of migrating to "pastures new," which the facilities of the Railway journey have made possible ; and in short, instead of living an isolated life mix with the world at large with courage and determination ; I have no doubt that they will become as flourishing as any peasantry on the face of the earth.

It behoves those amongst us who are landholders to try to improve the condition of their tenantry by encouraging them in every way and by showing them by their own example that the people are never slow to follow and adapt, and thus pave the way for their prosperity.

Gentlemen, I will not take up any more of your time but would conclude with wishing every success to this Exhibition, which no doubt, will convey many useful lessons to the lovers of Indian art and agriculture and appreciably advance the cause of our national progress.

APPENDIX IX.

NOTES ON THE INDUSTRIAL AND AGRICULTURAL EXHIBITION AT BENARES.

EXTRACTS FROM AN ARTICLE BY MR. PURAN,

Analytical Chemist (Tokio), Member of the Chemical and the Pharmaceutical Societies of Japan, in the "Indian Review" for January, 1906.

On the whole, the Benares Exhibition gave a bird's-eye-view of the Industrial India and the following industries, some of them pretty well represented, struck me. After counting them one by one, as I have on my note book, I will offer a few remarks on some of them.

The candles from Gujarat; the soaps of Bengal, Bombay and Cawnpore; the perfumes from Cawnpore and Kanouj; horn, ivory and silver work of Cuttack; cutlery of Dhulia, Khandesh; drills, twill, piece-goods, reeled thread from Bombay; glass manufactures of Rajpur and Umballa; pottery and fancy tiles from Jeypore; the brushes of various sorts of the Empire Brush Factory; the stone-ware of Gaya and Agra; ivory work of Vizagapatam; science apparatus from Umballa; pen-holders and nibs from Calcutta; umbrellas and buttons from Bombay; the sports materials from Sialkote; paints, colours and varnishes from Calcutta; silk weaving on the Chinese and Japanese lines of the Aligarh Weaving Mills; gold tapestry of Benares; enamel of Multan; the agate work of the Madras School of Arts; steel trunks from Sialkote and other places; locks, hinges and bolts, iron safes from Calcutta and other places; chrome-tanned leather goods from the Madras School of Arts and bark-tanned leather goods from Cawnpore; straw work and fine mats; cigarettes; hand-looms from Lahore, Calcutta and Baroda; sugar from Agra; plantain fibre and cloth from the Moola Rama Varma Technical Institute; woollen stuffs from Cawnpore; carpets, ribbon work on silk and velvet cushions by Miss Avabai Gudiali, Bombay; needle work and embroidery; engraving, photography and drawing; prison industry as well as the plantain preparations from Madras, all struck me as growing industries and with very green prospects for their future development in India.

GLASS INDUSTRY.

Considering the vast market of India and the enormous demand for glass articles, I have to confess that the Umballa and the Rajpur factories have only made a beginning and a very crude beginning, too. No doubt, the glass industry has many impediments in its way, but no organised effort has been made, as yet, to surmount them. I had a long interview with the manager of the Himalaya

Glass Works, Rajpura, who explained to me how they had, after a loss of Rs. 4,000, come to a stage from where they expected good profits henceforward. He pointed out the chief difficulty they encountered in training the blowers and that the Indian proprietors very soon lose their patience under such circumstances, not realising that this initial loss is to be reckoned as investment in such promising and clearly profitable industries.

By this time the first difficulty of finding good materials for glass is overcome. The Himalayan glass works quarry it from a mountain near Rajpura, and so do the Umballa manufacturers, not to speak of hills upon hills of pure quartz suited for the best sort of glass near Kangra and Gwalior. We should only grow wise to properly utilise what Nature places at our disposal in such a great abundance. The chief stumbling blocks, now, in our way to sure success are the want of practical knowledge, of cheap furnace making and the dearth of skilful blowers. There is only one way for their solution, and that is, by establishing a *Central Glass-blowing Institute*. This Institute should have two teachers to begin with, one experienced blower for *training Indian labourers and their children* in glass blowing, and another for *training Indian masons* in the art of furnace making. This arrangement will be far cheaper than to send our labourers out to foreign countries for this purpose; while there can be no possibility at all, of our educated young men learning the art of blowing, as in every country it is entirely in the hands of labourers working on comparatively low wages. This Institute will be a sort of an experimental glass factory with two foreign experts not costing more than Rs. 15,000 where a regular army of blowers and furnace-makers will be trained and equipped to be sent out, to spread the glass furnace, like hearth fire all over the country. It can be shown that such an Institute can be worked on commercial lines so that no monthly endowment may be needed. This would be charity in the right direction fraught with life-sustaining gifts of art. These two preliminary difficulties having thus been solved, it bids fair to become a staple industry of India.

I have ventured to propose a special glass-blowing institute, because it is my firm conviction that our honest efforts should be concentrated at one point, on one industry only, as it is simply futile to mix too many subjects and create an unworkable confusion. Oh, how strongly I wish there should be a strict specialization of the technical institutes to insure their real worth and solid utility!

POTTERY.

Pottery and enamel wares were very poorly represented at Benares. Kaolin has to be used if we have to make any advance in the ceramic art. Raniganj and Gwalior have extensive deposits of China clay. The furnaces that our potters use are very well adapted to the present needs and we have to make only slight modifications to bring them on a level with the Western appliances. This can be done by organising illustrated lectures by foreign-returned youths of India. As pottery is already ahead, we have to take a step in popularising ornamental pottery. To do this, we need an experienced artisan from Japan, to train our potters in the Japanese methods of painting, enamelling, and brick-burning. It would not cost more than Rs. 5,000

and his two years' stay amidst our artisans would be productive of grand results. I remember the Lahore Exhibition of 1893, where the beautiful vases of Multan were bought at high prices by foreigners almost with a passion. No reason, then, why our pottery should not grace the world's markets.

THE TOILET SOAPS.

This industry was fairly represented and it was pleasant to see the beautiful glass cases of the N.-W. Soap Co. and the Bengal Soap Factory. The Diamond Soaps of Bombay were good. But it is one drop in the ocean. They cannot supply even a small fraction of the great demand which is more than what two hundred factories may meet with. The plant for the toilet soap, including steam engine, if imported from Japan, does not cost more than Rs. 6,000, and the satisfactory working of the plant is well shown by the Bengal Soap Factory for which I brought one with me two years ago. The growing profits of the Bengal Soap Factory are, indeed, encouraging and our capitalists should look to this industry with business earnestness. If the Exhibitions fail to awaken the capitalists or to show new industrial routes to the Joint Stock Companies, I don't see any substantial good they may do in the growth of our industries.

Matches, umbrellas, buttons, metal-cutting as spoons, lamps, needles, pins, nibs—have not received that amount of attention which is their due. And so are the industries of leather-tanning, paper, cement and straw work not developed to the required extent. The methods in vogue with our tanners are very crude. Simple chemicals like sodium sulphide used to preserve sun-burnt hides in the lime vats, or those used in finishing the leather are quite unknown to them. A few technical lectures to our tanners will throw new light upon their industry. If such industries are to grow, they will grow at the hands of the common people in charge, through such means only. Cement is cruelly neglected while it may be a great paying concern with the abundance of extremely cheap raw materials available in the country.

THE INDIAN CURIOS.

Under this heading, I class the beautiful ivory work of Vizagapatam, horn work and inlaid ivory work of Cuttack, stone wares of Agra and Gaya, embroidery and tapestry of Benares, silver ware of Kashmir, wood work, etc., which, as productions of the art, are sure sources of wealth. Some of them are too costly and cannot be made commercial on any large scale. This was also the difficulty which Japan had to confront. Her curios being very valuable were not paying in the beginning. But they made exact patterns of their precious art-productions at very cheap prices, and to-day the Japanese curios is a great item in their exports. Our artisans do not know yet the value of perfect neatness, simplicity of design, faithfulness to nature, close intimacy with the technique of art and the value of artistic finish and packing. I think this lack of artistic knowledge is a great obstacle in the way of popularising our curios in the West. To do this, the best thing would be to send a dozen of our best artisans to Japan, for at least five years' stay there and learn the making of Japanese curios under Japanese workmen. On their return, they will

blend the Japanese and the Indian designs in very charming productions. I missed the exactness of design in the Indian curios ; and a sort of blazing beauty that is so conspicuous in the Japanese artisans, will be very costly and of little use.

But the beautiful needle-work and exquisite embroidery of Japan is done by women and it is not difficult to set up a department of embroidery and needle-work, in any girls' school with a lady artist from Japan as the teacher. One great thing that we have to learn from Japan is to produce, side by side with our precious curios, the cheaper editions of the same for the general market. Situated as we are, it is my firm belief that unless we let the Japanese exercise a predominating influence over our fine arts, and we put ourselves entirely under their training, there seem no prospects for any immediate and organic improvement in our arts.

Have I suggested too many things at once ? No. If the *Swadeshi* sentiment is real and if our leaders have the flaming ambition for organising our industries and arts into perennial sources of national wealth, then it should not be difficult at all to establish a dozen specialised Technical Institutes under the Japanese supervision and to have a dozen Technical Lectureships on behalf of the Industrial and Agricultural Exhibitions.

In conclusion, let me say, that the future of the Industrial Exhibition of the Congress, is undoubtedly a very hopeful one, in spite of all its shortcomings. Before something better and more is done, let us always have the pleasure of a cursory glance on the whole of Industrial India and thank with all our heart, the selfless workers and organisers of such patriotic, instructive and constructive institutions.

APPENDIX X.

THE GENERAL SECRETARY'S LETTER TO THE MEMBERS OF THE PROVINCIAL COMMITTEES OF THE INDIAN INDUSTRIAL CONFERENCE.

DEAR SIRS,

I send herewith for your consideration and such action as may appear suitable to you, a copy of the resolutions passed at the Industrial Conference held at Benares on the 30th of last month. For the purpose of giving effect to the recommendations made and the course of action laid down in these resolutions, Provincial Committees have been constituted for Bengal, Bombay, Madras, the United Provinces, the Punjab and the Central Provinces and Berar. You and the gentlemen mentioned on the margin form the Provincial Committee for You and the gentlemen mentioned are given the power to add others to your committee and to establish sub-committees wherever it may be considered desirable to do so. I beg your committee will kindly let me know what steps have been or are proposed to be taken in the matter. I would further suggest that your committee will select a secretary and communicate his name to me in order to facilitate communication and obviate unnecessary correspondence.

The work before the Provincial Committees is so vast that they cannot be expected to undertake the whole of it at once. With a view to secure systematic efforts and concerted action I would beg to know in what direction and on what lines your committee proposes to commence immediate work and in what order it considers that the other recommendations of the Conference should be given effect to. The views of your committee will be communicated to the other Provincial Committees whose views will be sent on to you.

I might be permitted to point out what work should be taken in hand by our Provincial Committees. The extension of scientific and technical instruction and the increase in the supply of articles of indigenous manufacture which are turned out at present should claim our first attention.

(A.) SCIENTIFIC AND TECHNICAL EDUCATION.

In regard to scientific and technical education it is hoped that the Government of India will be pleased to make before long substantial grants to the Local Governments and Administrations for the establishment of technical colleges and schools within their respective jurisdictions and to establish at least one Polytechnic Institute and academy of research for the country. In the Resolution which the Government of India issued two years ago on the report of the Committee on Industrial Education, they say :—" Such a scheme as has been sketched above both for larger industrial enterprises and for

smaller handicrafts must, the Governor-General in Council thinks, in the main depend upon Government and not upon private management." The different Provincial Committees should, it is suggested, approach their respective Governments and move them to take action in the matter and to give effect to the direction contained in the aforesaid resolution. But it is possible that some time may elapse before Government decide what course to follow, and it would obviously be undesirable to wait till Government take action or to depend entirely upon Government initiative and support. Bengal it seems will have before long at least one scientific and technological college established and maintained by private donations and subscriptions, and it is to be hoped that the other Provinces will make similar efforts to supply their deficiencies. To enable the Provincial Committees to determine their course of action I would mention some facts.

Bombay has got two institutions of the status of colleges where technical instruction is given—the Victoria Jubilee Technical Institute of Bombay and the College of Science at Poona. In the former provision is made for teaching mechanical and electrical engineering and textile manufacture ; in the latter there is fairly due provision for mechanical engineering. There are also at Ahmedabad, Surat, Poona, and Sholapur technical schools where what might be called elementary and secondary instruction is given. I ought not to omit the Kalabhuwan at Baroda which in addition to mechanical engineering gives instruction in some industries also. In Berar there will be started soon the Victoria Memorial Technical Institute at Amraoti, where instruction will be given in mechanical engineering, carpentry, smithy, turnery and general fitter's work. In the secondary private school opened a few months ago at Amraoti by the Berar Education Society it is proposed to add a weaving class in addition to the provision for general manual training and to have also classes for carpentry, smithy and turnery training. I mention all these things for this reason that as the resources of our people are very limited, we should husband them properly, and first direct their application in those directions where no provision exists at present. For instruction in mechanical and electrical engineering and manufacture of cotton or other textiles there is no facility in the three great presidencies of Bengal, the United Provinces and the Punjab, while the circumstances of our country require that attention must preferentially be bestowed on these. The Victoria Technical Institute of Bombay has applied itself mainly to these three courses. There was for some years provision made for teaching enamelling ; but this course had to be abandoned owing to certain difficulties. The capital expenditure for establishing an institute like the Bombay one—and it is not very lavishly or sumptuously equipped—would not fall below 8½ lakhs. The maintenance and the recurring charges would not be less than Rs. 50,000 a year. Even an institution like the Amraoti Victoria Institute which aims only at giving instruction in the mechanical engineering course in the higher school and in the courses of carpentry, smithy and fitter's work in the lower school, will require one lakh of rupees for capital expenditure and rupees 14,000 a year for recurring charges. Twenty lakhs of rupees would be required before a technical college which goes no further than the Bombay Institute can be established. Instead, therefore,

spending funds on small schools in different localities the most suitable course to adopt at present would be to have one fully equipped Technical college for Northern India and two secondary colleges or High-schools at Allahabad and Lahore. In the first college, in addition to the three courses mentioned above, there should be provision for teaching at least two more :—(I) Mining and metallurgy and (II) Industrial chemistry.

The requirements of Southern India are similar to those of Upper India. The matter for the Madras Committee to consider is whether the leaders of the educated community should not personally appeal to the rulers of the great states of Hyderabad, Mysore and Travancore, and obtain their help for the establishment of a fully equipped science and technological college. It would be well to have in addition to such college at least two secondary technical schools, one in the northern part of the presidency and the other in the southern.

As distinguished from general technical schools and colleges stand the crafts schools. There are several so-called industrial schools; but the majority of them are failures. A few of them are doing good work; but in regard to the majority the Government of India have pointed out how very defective they are. Efforts should be made to have the course of instruction in these places placed on a sound basis. The lines on which these schools should be conducted, how they are to combine effective practice in workshops with instruction in the principles on which a craft or industry is based is shown in the resolution of the Government of India.

Educational institutions in India are still conducted on methods which were prevalent in England till the other day. Those methods are found defective; and as in England facilities should be provided for the training of the eye and the hand, the development of the faculties of observation and experiment, and to bring the pupils of our schools more in contact with nature. The introduction of object lessons and the incorporation of drawing and manual training in the school curriculum claim our close attention. For manual training in general schools the course laid down in the hand-book of Drs. Thomson and Alexander (College of Science, Poona) might be followed with great advantage.

(B.) DEVELOPMENT OF EXISTING INDIGENOUS INDUSTRIES.

In the absence of the long asked for industrial survey the only way for carrying out this object is to employ such agencies as our people possess for collecting information from the different parts of the country regarding the main industries (besides agriculture) which give employment to any considerable body of persons. It is necessary to know what articles are prepared or manufactured, their quality, the approximate number of people employed thereon, the present state of the industries and their capability of improvement and expansion. If such information is obtained from the different Districts, I and the Assistant Secretary, Mr. Chintamani, will work in collecting it and issue half-yearly or yearly directories based thereon. I beg you will kindly give all the information you can in regard to these matters and request such of your friends and acquaintances as are qualified to help the object of the Conference, to give us the

benefit of their knowledge and experience. There are several industries which will be in a far more thriving condition than now if their products are consumed in larger quantities. So far as the restricted consumption of Indian articles retards the development of an industry the information collected is calculated to further such development.

(C.) ORGANISATION OF CAPITAL.

The third matter which deserves immediate consideration is what steps should be taken for raising the capital which is required for the creation of new industries and the improvement and development of old ones. So far as individual initiative and local organisations are supplying this want no action is called for just now from the Provincial Committees of the Conference. But there are important industries, like the Mining industry for example, in which Indian capitalists have hardly ventured to put forth any efforts, but which have assumed or are assuming an importance which makes it incumbent upon us to take serious counsel and to devise ways and means to obtain a due share for our people in these valuable industries. To take the instance of the Mining industry it is not to be expected that Government will permit the mineral resources of India to be undeveloped, because our people have not taken care to equip themselves with the requisite knowledge and experience, and cannot raise the necessary funds either through lack of means or want of enterprise. Foreign companies, possessing all these requisites, have already taken the field, and if we do not stir ourselves betimes we shall see the Mining industry of the country passing into the hands of foreign capitalists. The amount of capital required for this purpose will have to be very large; and this can be raised only if an united effort is made by the leading people of all the provinces. A Central Association in which such persons are combined and evince their practical interest by taking shares, will generate confidence and attract the help of the monied classes and the co-operation, according to their means, of the middle classes. Such an association will further have the advantage of possessing an influence which will facilitate the grant of concessions by Government, and it will enjoy a credit which would enable it to obtain loans on easy terms either in this country or from abroad whenever any occasion arises for the same. I beg your committee will discuss this matter with the leading men in your province and discover whether the suggestion made meets with their approbation and support.

I do not here make any reference to the textile industry, because I consider that Indian capital has already commenced to flow in that direction and further development may be left to the operation of natural causes. I regard the Mining industry as deserving of immediate attention, and I therefore give prominence to it.

I am, dear sirs,

Yours faithfully,

R. N. MUDHOLKAR,

General Secretary..

APPENDIX XI.

THE GENERAL SECRETARY'S CIRCULAR REGARDING INDUSTRIAL SURVEY.

DEAR SIR,—In continuation of the enquiries made and information requested in my printed Circular of January last,* issued to the Members of the Industrial Provincial Committees and printed in several papers for general information, I send herewith a set of questions framed for the purpose of collecting the information which it is essential that the Industrial Conference should have to deal in a methodical, satisfactory and effective manner with the work with which it has charged itself. I trust that you will be so good as to give early attention to this matter and send your reply at as early a date as possible, so that the information so collected might be compiled, classified and assorted before the beginning of October next. If the information sought for is received within the period mentioned, it is proposed to issue the classified compilation to the several Provincial Committees in time to enable the members to make specific proposals and recommendations based on it.

Yours faithfully,
R. N. MUDHOLKAR,

General Secretary, Indian Industrial Conference.

Questions to be Answered.

A.—AGRICULTURE.

1. What is the condition of the agricultural industry in your district?
2. Has the whole or the greater portion of the culturable area been brought under cultivation?
3. What is the general quality of the soil?
4. What is the general condition of the land-owning and cultivating classes?
5. To what extent are the lands held on a proprietary tenure by the cultivators themselves, to what extent by privileged tenants, and to what extent by mere tenants at will?

Vide Appendix X.

(c)

6. What steps are being taken in your district for the improvement of agriculture by—

- (a) Supply of cheap capital ;
- (b) Extension of scientific and practical instruction ;
- (c) Employment of improved appliances ;
- (d) Resort to recuperative processes like manure, etc.

7. To what extent has advantage been taken of the village co-operative credit system, and what amelioration has it effected in the condition of the peasantry ?

B.—MANUFACTURING INDUSTRIES.

8. Name the existing manufacturing industries in the different towns and villages of your district under the following heads :—

- (1) Textile fabrics— Cotton, Wool, Silk, and Jute.
- (2) Vegetable and animal products.
- (3) Leather, horn and paper.
- (4) Pottery, porcelain and glass.
- (5) Metals.
- (6) Chemical industries.
- (7) Furniture and decorations.
- (8) Materials used in construction.

9. What is their present condition ?

10. What was their condition in the past ?

11. What is the approximate number of people employed in and dependent on them severally ?

12. What is the approximate amount of capital employed in them severally ?

13. State how far they have been affected by competition with imported articles.

14. What are the markets for the products of these industries, &c., do they supply only a local demand, or are they sent to other markets in noticeable quantities ?

15. What facilities exist to increase their supply if an increased demand arose ?

16. How far, in your opinion, are the existing industries capable of expansion ?—

- (a) by making advances to the artizans at low rates of interest ;
- (b) by the improvement of the appliances in use ;
- (c) by the imparting of special instruction, and
- (d) by the employment of power machinery ?

(ci)

17. What industries existed in your district formerly but have since decayed?
18. What are the causes of their decay?
19. Is it practicable to revive any of them profitably?
20. If so, suggest measures to bring about their revival.

C.—MINERALS AND OTHER NATURAL PRODUCTS.

21. Name the mineral and other natural products of your district which are or can be manufactured into finished articles of consumption and use.
22. Which of these are manufactured in your district?
23. Which, if any, of these are sent to other parts of the country for manufacture?
24. Which of them are exported to foreign countries in their raw state, and re-imported as finished articles?

D.—CAPITAL.

25. What Banking facilities are there for the support of the industries in your district?
26. Have any Urban Industrial Banks been started in any town of your district under the provisions of the Co-operative Credit Societies Act?
27. If so, give particulars in regard to their organization, the capital employed, the conditions of lending and borrowing, etc.

E.—TECHNICAL EDUCATION.

28. What facilities are there for training young men in the various industries that exist in your district?
29. If there are any special schools for the purpose, give particulars in regard to their curricula.
30. Is instruction given both in the practice of and the principles which underlie an industry, or, is it theoretical merely or merely empirical?
31. What success has attended these schools?
32. Are industrial and commercial classes attached to any of the schools in your district?
33. If so, give full particulars in regard to them.

34. Have any students been sent abroad from your district to acquire technical, industrial or commercial education ?
35. What are their qualifications and were they tested ?
36. Who, or what agency, has sent them, and under what conditions, if any ?
37. In what countries are they being trained ?
38. What arrangements are made to utilise their special technical knowledge by the supply of capital or otherwise, to start or develop the industries in which they receive special training ?
39. Are there at present in your district any persons which have received special training in any industry ? If so, what are the industries in which they have been trained ?
40. How are they employed at present ?
41. If their knowledge is not being utilised, what steps can be, or are proposed to be taken, to utilize it ?

— — —
F.—INDUSTRIAL ASSOCIATIONS.

42. Is there any industrial association in your district ? If so, give particulars in regard to its objects, rules, funds, past work and present activity ?
- — —

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241	8 "	constitutions	communities
246	2 "	officers	offices
248	8 from bottom	my	may
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